20-K
Options

Dubner Computer Systems

20–K Options

Software Version 2.0

DUBNER

Dubner Computer Systems

6 Forest Avenue
Paramus, NJ 07652

A Grass Valley Group Company

CONTENTS

SOFTWARE SITE LICENSE i

FONTS 1
    International Character Sets 1

BACKGROUNDERS 3

K_WORKS2 5

MACROS AND K-PROGRAMMING LANGUAGE 9
    1. KEYBOARD MACROS 11
    2. K PROGRAMMING LANGUAGE 13
        2.1 K Programs 13
        2.2 The K Editor 15
        2.3 Keystrokes 16
        2.4 Commands 17
        2.5 Comments 17
        2.6 Recording and Playing a K Program . . 18
        2.7 K Variables 18
        2.8 Expressions 20
        2.9 Loops and Conditionals 20
        2.10 Subroutines 22
        2.11 Global and Local Variables 23
        2.12 K Program Parameters 24
        2.13 Returning from a K Subroutine 26
        2.14 Exiting from a K Program 27
        2.15 Status Monitor Commands 28
        2.16 Control the Keyboard and K Playback 29
        2.17 Serial Input and Output 32
        2.18 Type Conversions 33
        2.19 String Operators 34
        2.20 K Commands by Category 35
        2.21 System Variables 37

K-SERIES VIDEO DIGITIZER 41
    1. INTRODUCTION 43
    2. UNPACKING 44
    3. OPERATING ENVIRONMENT 45
    4. RACK MOUNTING 46
    5. CONNECTING THE DIGITIZER 47
    6. CONFIGURING A 20-K PORT 49
    7. DIGITIZER CONTROL PANEL 50
    8. SETTING UP THE CAMERA 51
    9. CAPTURING A FONT 52
    10. CAPTURING A BACKGROUND 54
    11. STAND-ALONE DIGITIZER 57

K-PAINT SYSTEM 59
- 1. INTRODUCTION 61
  - 1.1 Starting K-Paint 62
  - 1.2 The K-Paint Menu 63
  - 1.3 The K-Paint Brush Palette 66
    - Palette Scales 69
    - Paint Pots 70
    - Shapes and Styles 71
    - Locked/Unlocked Palette 72
  - 1.4 Zoom and Pan 73
- 2. K-PAINT FUNCTIONS 75
  - 1-PAINT 75
  - 2-FILL 76
    - ANY 76
    - BORDER 77
    - AREA 77
    - CEL 78
  - 3-GRFX 79
    - LINE 79
    - RECT 79
    - ELLIPSE 81
  - 4-RAMPS 82
    - RAMP 82
    - LEFT HUE 83
    - RIGHT HUE 83
  - 5-EFFECTS 84
    - MOVE WRAP 84
    - MOVE REG 84
    - LINK 84
    - QUANT 85
  - 6-CHANGE 86
    - GLOBAL 86
    - AREA 87
    - PIXEL 87
- 3. THE FONT FIXER 89
  - 3.1 Stamping Entire Fonts 89
  - 3.2 Painting Individual Characters 92
- 4. READ AND RECORD 95
- 5. INSTALLING THE PAD 97

THE RGB SCANNER 101
- 1. INTRODUCTION 103
  - 1.1 Advisory 103
- 2. SCANNING 105
  - 2.1 The FROM Box 106
  - 2.2 The TO Box 107
  - 2.3 Aspect Ratio 107
- 3. QUANTIZING 108

4. INSTALLING THE SCSI CONDITIONER . . . 110
   4.1 Unpacking 110
   4.2 Removing the Unit from its Case 110
   4.3 Modifying the CPU Card 111
   4.4 Replacing the Unit in its Case 111
   4.5 Cabling the SCSI Conditioner 112

PRESENTATION GRAPHICS MANUAL 113
1. INTRODUCTION 115
   1.1 Definitions and Rules of Composition . 116
2. DESCRIBING THE MENUS 123
   2.1 The Title Line 125
   2.2 The Menu Line 126
   2.3 The Sub-menu Line 126
   2.4 The Control Fields 128
   2.5 Additional Menu Information 132
3. THE GRAPHS AND CHARTS 135
   3.1 Graph Order 135
   3.2 Graph Data 137
   3.3 Graph Style 144
   3.4 Chart Foreground 146
   3.5 Chart Edge 149
   3.6 Chart Drop Shadow 150
   3.7 Chart Grow 151
   3.8 Legend 151
   3.9 Axes 152
   3.10 Grid Lines 154
   3.11 Tick Marks 154
   3.12 Slide Add 155
   3.13 Slide Order 155
4. OTHER KEYS 157
5. RECORDING AND READING 161
   5.1 Record 161
   5.2 Read 162

PRESENTATION GRAPHICS PRIMER 163
1. INTRODUCTION 165
   1.1 Anti-aliased Slides/Backgrounds 165
   1.2 Getting Started 166

2. OPERATING GRAPHICS 169
   2.1 Procedure 169
   2.2 Edit a Slide 170
   2.3 Record a Slide 171
   2.4 Edit a Graph 172
   2.5 Change Colors of a Selected Item 173
   2.6 Display Data 173
   2.7 Record the Graph 174
   2.8 Grow Bars 174
   2.9 Data 175

2.10 Change Colors of Individual Columns 176
2.11 Grids and Ticks 176
2.12 Label a Graph 177
2.13 Pie Chart 177
2.14 Fill Chart 179
2.15 Scaling 181
2.16 Convert a Slide to Messages 182
2.17 Scatter Chart 183
2.18 Multiple Graphs on a Slide 184
2.19 Line Chart 185
2.20 Column Stack Chart 186
2.21 Display Data Percentages 187
2.22 Delete a Graph 189
2.23 Bar Chart 189
2.24 Bar Stack Chart 190

3. ANALYZING SLIDES 193
3.1 Overlapping Graphs 193
3.2 Drawing Order 194
3.3 Tick Marks and Grids 194
3.4 Data 195
3.5 Sort Graph Data 197
3.6 Numeric Sequence Graph 197
3.7 Chart of a Graph 198
3.8 The Chart Legend 198
3.9 Data of a Pie Graph 198
3.10 Sequence Graph 201
3.11 Number Graph 203
3.12 Point Text Data 203

HOW TO USE WORDPERFECT TO DRIVE DUBNER CHARACTER GENERATORS 205
1. INTRODUCTION 207
2. CONNECT A DUBNER PORT TO A PC PORT 209
3. CONFIGURE WORDPERFECT 210
3.1 Set the Printer Parameters 210
3.2 Select the Printer Options 211
4. CONFIGURE THE DUBNER 212
5. WORDPERFECT MACROS 214
5.1 Select a Selector 214
5.2 Center or Position Text 215
5.3 Start a Text Function 216
5.4 Record a Message 217
5.5 Generate Text on the Dubner 217

FIGURES

Figure 1. 20-K to Digitizer RS 422 Cable 48
Figure 2. Character Capture Guide lines (Digitizer) . . . 53
Figure 3. Background Capture Guidelines 55
Figure 4. The Pad with Menu 63
Figure 5. The Pad with No Menu 64
Figure 6. K-Paint Palette 66
Figure 7. K-Paint Palette with Menu 67
Figure 8. Wacom Bitpad Settings 98
Figure 9. GTCO Bitpad Settings 99
Figure 10. 20-K to Howtek Scanner 109
Figure 11. The Rear Panel 111
Figure 12. Screen Elements 117
Figure 13. 20-K to PC RS-232 Cable 209

MENUS

Menu 1: Port Configuration for the Video Digitizer 49
Menu 2: Background Capture with Digitizer 54
Menu 3: Even-odd Length Pixels 62
Menu 4: Top Three lines of the Status Monitor 63
Menu 5: Palette Menu 68
Menu 6: 1-PAINT 75
Menu 7: Font Fixer mode - Stamping 90
Menu 8: Font Fixer mode - Paint Character 92
Menu 9: Set the Port 98
Menu 10: Slide Size 124
Menu 11: Graph Order 136
Menu 12: Graph Data 137
Menu 13: Graph Data-Seq 140
Menu 14: Graph-Data-Seq-Date 141
Menu 15: Date Display Format 142
Menu 16: Graph-Data-Seq-Seq 143
Menu 17: Graph-Data-Seq-Sort 144
Menu 18: Graph Style 145
Menu 19: Chart Foreground 146
Menu 20: Pie Graph Data 148
Menu 21: Axes Scaling 152
Menu 22: Slide-Add 155
Menu 23: Slide-Order 156
Menu 24: PGraph Flags 157
Menu 25: Configuration Functions (Page 2) 213

To initiate each optional program, insert the option's disk
into the drive and press the RESET button.

SOFTWARE SITE LICENSE

Sharing a software option on multiple ***like*** systems ***at the same site*** is available at a one-time only, 50% surcharge. Like units purchased after the payment of the 50% surcharge will be enabled for the option automatically, free of any additional charge (except for the cost of the disk medium).

LIKE SYSTEMS ARE GROUPED AS FOLLOWS

Group 1: 5K, 10K, 20K, 30K, GF
Group 2: DPS1, TURBO, DSS-4

Options applicable to this license must be "purchased." For example, AA-1 and AA-2 are standard on the 30K and the GF. To use them on one 20-K at the same site, purchase them at cost. To use them on other Dubner character generators at the same site, you must pay the 50% surcharge.

When ordering "no charge" option software for sharing, state clearly all SINs within a system family group. Use model numbers ending with "SP" in the current price lists to purchase "sharing rights."

This policy applies only when the option is available for that product.

FONTS

Our standard fonts have international character sets. The complete font packgage includes six typefaces, each in four sizes, plus four extra sizes on the most popular typeface; an anti-aliased Master font which you can scale from 4 to 150 scan lines; and special purpose fonts. See Chapter 9 in the User's Guide.

In addition, the 20-K supplies the following font options:

AA-1, AA-2, AA-3, AA-4, AA-5. Each set contains 16 anti-aliased Master fonts. See the Dubner Anti-Alias Font Brochure for styles.

F-1 contains six non-anti-aliased fonts in four sizes each. International character sets are not included in this option.

Handel	44, 38, 30, 22
Lubalin	46, 38, 28, 22
Windsor	44, 38, 29, 23
American Typewriter	48, 38, 26, 16
Cloister	44, 36, 30, 24
Franklin Gothic	52, 44, 36, 28

International Character Sets

Anti-aliased fonts on the Dubner K-series Character Generators and the Graphics Factory include the character sets for the following languages: American English, Czech, Danish, Faeroe Island, Finnish, French, French Canadian, German, Icelandic, Italian, Magyar, Norwegian, Portuguese, Romanian, Serbocroatian, Slovakian, Spanish, Swedish, Swiss French, Swiss German, United Kingdom. Cyrillic and Greek fonts are optionally available.

Keyboards with engraved keycaps are optionally available, in French, German, Italian, Spanish, Swiss French, Swiss German, and Cyrillic. Blank keycaps for custom engraving are available upon request.

BACKGROUNDERS™

The Backgrounders are a computer generated graphics library. Backgrounder 1 and 2 were created on the CBG\Texta Dubner Computer systems.

Backgrounders I and II each include 200 graphics of people, events, buildings, landscapes, starfields, and spacescapes. There are all-purpose wallpaper effects, three-dimensional frames, scrolls, grids, maps and patterns in many sizes and colors. They each come on one 10 megabyte disk.

Backgrounder III offers ready-made contemporary patterns and textures and is ideally suited for creating custom fonts (with the K-series Video Digitizer or K Paint) or for use as full screen backgrounds. They are available on two 10 megabyte or one 20 megabyte cartridge(s). Backgrounders III and IV were created on Dubner full-color paint systems, and were specially prepared for the Dubner character generators in 250 color format.

Backgrounder IV features contemporary, partial screen displays over transparent backgrounds. These graphics are designed for keying displays over video or for creating your own backgrounds. They are available on a 10 megabyte or a 20 megabyte cartridge.

We recommend that you quantize these images for use with long text messages and anti-aliased fonts. (The longer the text message, the fewer the display colors.) We also recommend that you use **Confg A** and reduce the fonts' anti-aliasing level to 4.

To quantize

- Prepare a formatted disk to receive the quantized images. Some of the factory disks are full. Fortunately, quantizing reduces the size as well as the number of colors.

- Do the following Do command:

  Do `qrgb` *# of colors* **Enter**

The Do command `qrgb` weaves text (if any) onto the background, then reduces the colors on the screen to the specified number (*# of colors*).

Some backgrounders with areas specifically designated for typing may not require as large a reduction of colors as other backgrounders. Some backgrounders may require as few as 20 colors. This is a decision which only the artist can determine through trial and error.

To read in a background, type the name IN_UPPER_CASE_LETTERS, type the numbers, and always use an underscore (_) in the spaces.

K_WORKS2

K_Works2 offers pre-written K Programs designed to help you to do the chores you need done. K_Works2 plays back specially constructed programs for immediate use.

K_Works2 is an independent option. It does not require the K Programming Language option, although with K Programs you can edit K_Works2.

K_Works2 is divided into two volumes. (Volume 1 is also included with the K Programming Language option. It provides sample programs to study as learning aids for writing additional K programs.)

Volume 1 features basic utility functions to automate housekeeping chores. Volume 2 contains production and animation programs for custom effects and combinations of effects. We include the popular custom American flag graphic and American flag waving animation.

The K-Works2 User's Guide explains how to use these programs. In addition, there are K-Works Quick Reference Cards for each volume. Place these cards nearby when running K-Works2.

To read in a background, type the name in UPPER_CASE_LETTERS and use an underscore (_) instead of a space.

We recommend that you have a formatted disk available to record selected K-Works2 programs and backgrounds. These disks are full!

Volume 1

General Programs are basic "housekeeping" programs that perform the chores of starting up and maintaining K-Works.

```
INIT
KW_INFO
```

Utilities give the user a variety of tools for more efficiently performing day-to-day work on a K-series machine.

COPY_5_DRIVE_2
COPY_ALT
COPY_EVERY_OTHER
DELETE_WORKSPACE_1
QUANTIZE_SERIES
REVERSE_COPY
SLATE_MAKER

SLATE_MAKER_COUNTDOWN
SCALE_DOWN_SERIES.25
SCALE_DOWN_SERIES.33
SCALE_DOWN_SERIES.5
SCALE_DOWN_SERIES.66
SCALE_DOWN_SERIES.75

Font Programs include a custom font for animation, a K_Works menu/titles font as well as programs for automatically loading an assortment of pre-selected fonts into the selectors.

SINGLE-STYLE/MULTIPLE SIZE
COOPER_BOLD
FUTURA_MEDIUM
LATIN_MEDIUM
PREST_12
SWISS_AA
SWISS_BOLD

MULTIPLE-STYLE/SINGLE SIZE
KW_FONTS
SELECTION_16
SELECTION_24
SELECTION_36
SELECTION_56

FONT ANIMATION PROGRAMS
FLAG
FLAG_WITH_TEXT

SPECIAL FONTS
#9500-AMERICAN FLAG
#9501 K_WORKS FONT

Palette Programs provide a variety of palettes and dynamic changes from one palette to another.

GREY_PALETTES
PASTEL_PALETTES

PASTEL_PALETTES_2
PRIMARY_PALETTES

Syntax Modules give a range of "code examples" that can be modified and integrated into other K programs (K Programming Language option required).

K_WORKS_PROGRAM_FORMAT
SET_UP
SYN_1_LINE_B&WTEXT
SYN_2_LINE_B&WTEXT
SYN_3_LINE_B&WTEXT
SYN_4_LINE_B&WTEXT
SYN_ASK_USER

SYN_COUNTING_LOOP
SYN_LOCKOFF
SYN_LOCKON
SYN_TEXT_ENTER
SYN_RENAME
SYN_TEXT_GROW/MOVE_ENTER
SYN_TITLE

Background Art is a sampler of ppics. **Read** them as you would any other ppic (use caps and underscore the spaces).

BIG_CHIP
BIG_CHIP_2
COUNT3 to COUNT10
HI_TEK_1
HI_TEK_EMBOSS
RAMP_30_RED_PURPLE
RAMP_40_BLUE_GREEN
SLATE_BASIC2
TITLE_BASE
VERT_CHIP

Volume 2

The second volume of K_Works2 contains actual production and animation programs for custom effects and combinations of effects as well as effects over a background.

General Programs relate to start-up and general housekeeping chores for running K-Works2. They are seldom run on their own, but usually are called up by other K-Works programs.

INIT
KW_INFO
DELETE_WORKSPACE_2

Production Programs provide a variety of programs for creating special effects, animations and combinations of these for production applications.

MAIN MODULES

2_HI_TECH_CHIP_REVEAL_DOWN
2_SCROLL_MOVE_DOWN
GROW_SHRINK_MIDDLE
GROW_SHRINK_WITH_TEXT_MIDDLE
LOWER_THIRD_SLIDE_2
OS_BOX_MOVE_IN
PPIC_GROW/TEXT_MOVE_BOTTOM
PPIC_GROW/TEXT_MOVE_MIDDLE
SHADES
SHADES_OVER_BKG
SLIDE_2_TEXT_HALVES
SLIDE_TEXT_HALVES_OVER_BKG
TV_LOGO_MOVE_BOTTOM
TV_LOGO_MOVE_MIDDLE
TV_LOGO_MOVE_TOP

SUB MODULES *(not used directly but called by MAIN MODULES listed above)*

M2_MOVE_SCROLL
MOVE_BOTM_BOX
MOVE_HT_CHIP_30
MOVE_HT_EMBOSS
MOVE_M2_30
M2_MOVE_SCROLL
MOVE_HT_STRIP
MOVE_TOP_BOX

Effects Over Backgrounds take the popular "tumble," "squash," "slow-reveal," and "climb together" effects and combine them with your background to create animations of "effects over backgrounds."

CLIMB_TOGETHER_OVER_BKG
SLOW_REVEAL_OVER_BKG
SQUASH_PPIC_OVER_BKG
SQUASH_TEXT_OVER_BKG
TUMBLE_PPIC_OVER_BKG
TUMBLE_TEXT_OVER_BKG

Background Art is a sampler of ppics. **Read** them as you would any other ppic (use caps and underscore the spaces).

AMERICAN_FLAG
BIG_SCROLL
BKG
BKG_3_SAMPLE
BOTM_BOX
HI_TEK_1
HI_TEK_2
HI_TEK_5
HI_TEK_6
HI_TEK_7
HI_TEK_8
HI_TEK_13
HI_TEK_15
KW_INFO
MORNING_SKY
O_SHLDR_BOX1
TOP_BOX
RAMP_30_BROWN_BLUE
YOUR_LOGO
YOUR_PPIC

Macros and
K-Programming Language

May 10, 1990

Software Version 2.0

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1. KEYBOARD MACROS

As you operate the 20-K, you'll sometimes find yourself repeating the same keystroke sequences over and over. This can be tiresome and leads to errors. Instead, use **Learn** to create keyboard macros. A ***keyboard macro*** is a user-defined Do Command that automatically types a keystroke sequence for you.

To create a keyboard macro:

1. Press **Learn**. The status monitor says `LEARNING.`
2. Type the keystrokes you want the 20-K to remember. The keys will do what they normally do.
3. Press **Learn** again to stop learning. The status monitor prompts for a name.
4. Type the name of the macro and press **Enter**. The 20-K records the macro.

To play back a keyboard macro:

1. Press **Do**.
2. Type the name of the macro.
3. Press **Enter**.

In effect, you have created your own Do command!

IMPORTANT TRICK: If you have a frequently-used macro, give it the name `ALTa` when you record it. The program does not differentiate between upper case and lower case, so ALTA is the same as ALTa. To play it back, just press **Alt** followed by **a**. You don't need to press **Do** or **Enter**. That way, you can play back your macro by pressing just two keys. You can use all of the letters to make macros `ALTa` through `ALTz`, so you can use all the letters of the alphabet to make macros. When you run out of letters, use combinations, e.g., `ALTbc`. (By the way, you can also type **Do** `ALTa` **Enter** for these.)

Let's imagine a situation where keyboard macros might be useful. Say you've already recorded 30 pages of text for some closing credits. The text is all in font 232, and all the pages are left-justified. Now the director comes in. "That's great," she says. "But... could you do the whole thing over with a smaller font, and all of the text centered?" Your first impulse is to panic; you're on the air in seven minutes! Not to worry. Here's what you do.

Assign the new, small font to Selector 1. Read in the first message of the series. Then press the following keys:

Learn Text P Center P Alt Rec Learn

Record the macro at `ALTc`. You have just fixed the first page of text. To fix the next page, read it in and type **Alt c**. And so on. You can even make the Read part of the macro.

Keyboard macros can be edited and combined with loops, variables, if-then-else, and other programming tools to create powerful, customized functions. You do this using the 20-K's built-in programming language, "K."

2. K PROGRAMMING LANGUAGE

K is the 20-K's own programming language. Using K, you can tailor the 20-K to fit almost any situation. K is especially well-suited to real-time applications where the 20-K must respond to changing conditions on the fly. For example, K programs can "play" a game show, report election and sports results, assemble a series of images and create an animation from them, control another computer, be controlled *by* another computer. And so on.

K is a true programming language. It combines many of the best features of C, BASIC and K's predecessor, KPL. K supports subscripted variables, floating point and integer arithmetic, if-then-else and loop-while constructs, subroutines, text manipulation, and serial I/O.

K is an "interpretive" language. As the 20-K plays back a K program, the K interpreter parses, then executes, each line. K programs cannot be compiled.

Most of the material in this chapter assumes that you already know something about computer programming. Although K can be used simply as a keystroke macro editor, its real power comes from its programming language features.

WARNING: Non-English characters cannot be submitted to the `type` command. This difficulty will be corrected in later programs.

2.1 K Programs

A ***K program*** is a sequence of keystrokes and commands. ***Keystrokes*** are 20-K keystrokes; when you play back a K program, the 20-K types those keys as if you had typed them yourself. ***Commands*** are either normal Do commands, or other K programs.

There are two ways to create a K program:

1. Use **Learn**.
2. Use the K editor.

2.2 The K Editor

Press **K** to enter the K editor. The status monitor displays the program you are currently editing. The K editor acts like a word processor to let you create and modify your program.

These are the keys that work in the K editor:

Insrt	Toggle between ***insert mode*** and typeover mode.
Del	Delete the cursor character. To join two rows, move the cursor past the last word of the first row and press **Del**.
Alt Del	Delete the cursor row. All rows below move up.
Backspace	Delete the character to the left of the cursor. If the cursor is on the first character of the row, move the cursor row up to the end of the row above.
Shift-Row + [↓]	Display the next page of the program.
Shift-Row + [↑]	Display the previous page of the program.
[↑] [↓]	Move the cursor up or down one row.
Alt [↑] [↓]	Move the cursor to the top or bottom row of the current page.
Kern/Xchg [↑][↓]	Exchange the cursor row with the one above or below.
Alt New-Line	Copy the cursor row and insert it one row below. The cursor remains on the original row.
Home	Move the cursor to the first character of the first page of the program.
Alt Home	Move the cursor to the last character of the program.
Shift-Char + [↑] [↓]	Scroll through the program one row in the direction of the arrow.
Alt [←] [→]	Move the cursor to the first or last character of the row.

2.3 Keystrokes

To enter typewriter keystrokes into a K program, first press **K**. The bottom of the status monitor tells you you're in `<<<Keystroke>>>` mode. Then, press as many typewriter keys as you like, and they will be entered into your program. Press a non-typewriter key to leave keystroke mode.

To enter a 20-K keystroke into a K program, first press **K**, then press the key. For example, **K Home** puts the **Home** key into the K program, and *does not home the cursor*. The K editor leaves keystroke mode automatically, after you press **Home.**

Learn is another way to enter keystrokes into a K program. While you're in the K editor, press **Learn**. You'll find yourself back in Compose mode, and the status monitor notes that you are `LEARNING.` Now any key you press will not only do what it normally does, but it will also be entered into your K program. To get back to the K editor and stop learning, press **Learn** again.

Let's try an example. Press **K** to enter the K editor. Press **Erase-Text** twice to clear any previous K program that might have been left around. Now press **Learn.** You're back in Compose mode, learning.

Type `Dubner` **New-Line** `20-K.` Now center it with **Centr M.** Okay, that's enough—press **Learn** to stop learning. The K editor shows you what it has learned:

```
Dubner <New-Line> 20-K <Center> m
```

Why are `Dubner` and `20-K` underlined? In a K program, letters and numbers represent either 20-K keystrokes *or* K variables and commands. To differentiate, the K editor underlines any characters that are meant to be typed literally by the 20-K. If the characters are not underlined, then they are K commands or variables. For example:

`select 1 2`	is the command to select 1-Iomega for messages, 2-Iomega for fonts.
`select 1 2`	types the characters `s-e-l-e-c-t-space-1-space-2` on the color monitor, using the current Selector.

`<New-Line>` and `<Center>` are the K editor's version of **New-Line** and **Centr.** Move the K editor cursor to `<New-Line>.` The cursor highlights the entire key, since it represents a single keystroke.

2.4 Commands

Enter commands into K programs by typing them as you would a Do command. Don't press **K** first. Here are two examples:

```
select 1 2

copy 5 1 foo
```

In the K editor, commands are not underlined because the letters and numbers are not "typed" by the 20-K; the command is executed directly by the K interpreter. (Incidentally, you *could* put a Do command into a K program like this:

Do `select 1 2` **Enter**

...but that takes too long to type. Why bother?)

To put more than one command on a single line of a program, separate the commands with semi-colons:

```
select 1 5; fscale 60001 132 32; select 1 1
```

To make a command extend beyond one line, use a backslash:

```
fscale  60001  132  32  -all  hscale=80 \
     comment="Clarendon 32 no edge" \
     filter=narrow
```

2.5 Comments

To add a ***comment*** to a K program, use a pound sign (#):

```
# this statement does nothing

select 1 2    #this is a comment
```

Anything to the right of a pound sign on that line is ignored by the K interpreter, when a K program is executed. Comments may live on the same line as real K commands, as long as the comment is to the right of the command.

2.6 Recording and Playing a K Program

K programs are recorded like any other message. From the K editor:

Record *name* **Enter**

To play a K program,

Do *name* **Enter**

To play a K program from K edit, press **Enter** twice. You can't start a program in the middle; the program always begins at line 1.

To stop a K program before it finishes on its own, press **Quit**.

Like keyboard macros, K programs can be named `ALTa` through `ALTz` and played back with **Alt a**, etc. See "Keyboard Macros" in Section 11.5. You can also have a K program execute automatically any time the 20-K is re-booted. Just record your program under the name `INIT`, on the disk you are re-booting from.

2.7 K Variables

A ***K variable*** is a string of up to 16 characters, with the first character always a dollar sign ($). K variable names may include upper and lower case letters and numbers, but not imbedded spaces or punctuation (exception: underline is permitted). The character immediately after $ cannot be a number. Here are some examples of valid K variable names:

```
$i
$height
$last_place_team
$MiddleInitial
$horse12
```

K variables come in four flavors: integer, real, string and keystroke. You don't need to declare variables explicitly; a variable's type is determined by what you assign to it.

Here are examples of assignment statements for each variable type:

ASSIGNMENT	TYPE OF VARIABLE
`$i = 1`	integer
`$string = blah`	string
`$fred = "hello world"`	string
`$position = 1.234`	real number (floating point)
`$key = <Home>`	keystroke

If a string contains imbedded spaces or punctuation, surround it with double quotation marks.

To put a keystroke into a variable assignment statement, press **K** followed by the key. Do not type the key's name letter by letter.

K variables may have a single subscript. Any K expression that evaluates to an integer may be used as a subscript. Some examples:

```
$horse[12]
$state[$i]
$a[3 * ($b + $c)]
```

The K interpreter stores subscripted variables the same way it stores simple variables, and does not allocate memory for arrays. Thus the three K variables `$a[1]`, `$a[5]`, and `$a[9999]` use only three K variable slots, not 10,000.

If you try to use a variable before you assign a value to it, the K interpreter will stop executing the program, and give you a "variable not found" error message.

2.8 Expressions

Arithmetic and logical expressions may be used in assignment statements. K uses a subset of C's operators and precedence rules, with a few extensions. The following table summarizes the operator precedence rules, in order of decreasing precedence:

[]	Subscript
()	Parentheses
! ~ -	Logical not, one's complement, unary minus
* / %	Multiply, divide, remainder
+ -	Plus, minus
<< >>	Shift left, shift right
%%	Concatenate strings
< <= > >=	Comparison operators
== !=	Equality, inequality
&	Bitwise AND
^	Bitwise exclusive OR
|	Bitwise OR
&&	Logical AND
||	Logical OR

There are no ++ or += operators.

Use (nested) parentheses to remove ambiguity in arithmetic expressions:

```
$f = 32 + (1.4 * $c)

$inc = (($i+1) * ($j+1)) / 100
```

2.9 Loops and Conditionals

K programs are controlled by ***K commands***. K commands look exactly like Do commands in the text of a K program, and that's essentially what they are. For convenience, we have grouped them together in this chapter, instead of in the Do command chapter.

Some K commands control the logical flow of a K program. Others display text on the status monitor, interact with the operator, control serial input and output, and so on. We'll start with the program flow commands:

`loop [`*count*`]`
  keystrokes
  commands
`end`

Repeat the *keystrokes* and *commands* between the `loop` and its corresponding `end` the number of times specified. If no *count* is supplied, loop forever, unless a `break` statement is encountered. (Press **Quit** to break out of an endless loop and stop the program.) Loops may be nested. The following program types "hello" five times, once per line:

```
loop 5
    hello <New-Line>
end
```

`while` *expression*
  keystrokes
  commands
`end`

Repeat the *keystrokes* and *commands* between the `while` and its corresponding `end` for as long as the `while` expression is true. The `while` expression is re-evaluated each time the loop starts over. The following program is equivalent to the program above:

```
$a = 1
while $a <= 5
   hello <New-Line>
   $a = $a + 1
end
```

`if` *expression*
  keystrokes
  commands
`[else`
  keystrokes
  commands`]`
`end`

Conditional if-then-else. Evaluate *expression*; if true, execute `if` portion; if false, execute `else` portion. The `else` portion is optional. Remember, to put more than one K command on a single line of a program, the commands must be separated by semi-colons:

```
if $a==0; <Enter>; else; <Tab>; end;
```

`continue`	Restart the current loop. The current loop is the nearest `while` or `loop` command, directly above the `continue`.
`break`	Exit from the current `while` or `loop` by skipping down past the nearest `end`.

The following program (which doesn't really do anything) shows how to use `continue` and `break`:

```
while $a <= 5
  if $b == 2 # this is a comment
    continue # goes back to "while"
  end
  if $b == 3
    break    # exit from "while" loop
  end
end
```

2.10 Subroutines

A K program may call another K program as a subroutine. For example, say you've already recorded a K program called `rubble`:

```
# the rubble family
<New-Line> Barney
<New-Line> Betty
<New-Line> Bam Bam
```

and another K program, called `flintstone`:

```
# the flintstone family
<New-Line> Fred
<New-Line> Wilma
<New-Line> Pebbles
```

You can call these two K programs as subroutines from a third K program, `bedrock`:

```
# names of Bedrock inhabitants
rubble
flintstone
```

Subroutines look just like Do commands to K.

2.11 Global and Local Variables

Any K variables that you use in a program are local to that program. Local variables are allocated temporarily during the execution of a K program, then automatically deleted when the program terminates. Program B can not reference Program A's local variables, even if Program B is a subroutine called by Program A.

In order for multiple K programs to share variables, the variables must be declared global, using the `global` command:

```
global  $variable1 [$variable2 $variable3...]
```

Once they have been declared, global variables stay active until you re-boot the 20-K, even if no K program is currently running. Any K program may reference any global variable.

The amount of 20-K memory reserved for global variables is not infinite, and it is possible to fill it up if you use a large number of globals. However, you can release any global variables that are no longer needed, using this command:

```
free_globals [$variable1 $variable2 $variable3...]
```

If no variable names are specified, `free_globals` frees all global variables.

To illustrate how global variables are used, let's modify our previous example to list the inhabitants of Bedrock by gender. We'll declare a variable `$sex` that equals 1 for men, 2 for women. Now the K program `rubble` becomes:

```
# the rubbles
if $sex == 1
      <New-Line> Barney
      <New-Line> Bam Bam
end
if $sex == 2
      <New-Line> Betty
end
```

The `flintstone` program becomes:

```
# the flintstones
if $sex == 1
      <New-Line> Fred
end
if $sex == 2
      <New-Line> Wilma
      <New-Line> Pebbles
end
```

Finally, our main program `bedrock`:

```
# list the men in bedrock
global $sex
$sex = 1
rubble
flintstone
free_globals $sex
```

Now let's run `bedrock`. Type **Do** `bedrock` **Enter**. The 20-K types `Barney,` `Bam Bam` and `Fred`. If we forgot to declare `$sex` to be global, then `rubble` and `flintstone` wouldn't know about that variable, and the K playback would abort with a "variable not found" error message.

2.12 K Program Parameters

Like Do commands, K programs can have positional, flag and keyword parameters. This is true both for K programs that an operator starts with the **Do** button, and for K programs that are called as subroutines from other K programs.

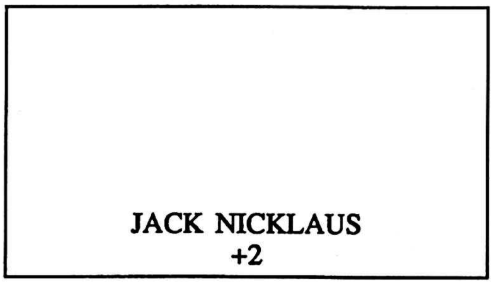
Positional parameters are defined implicitly, and automatically assigned to the pseudo-variables `$1`, `$2`, and so on. (The pseudo-variable `$0` contains a count of how many parameters have actually been passed.) For example, here's a K program called `golf` that types two lines of text as a lower third:

```
# type 2-line lower third
# using selectors 1 and 2
<Erase-Text>
<Sel-1>; type $1; <New-Line>
<Sel-2>; type $2; <Center> 1
```

`$1` and `$2` refer to the first two positional parameters, when the `golf` command is invoked. To run the `golf` program, go to the character generator and type

Do `golf "JACK NICKLAUS" "+2"` **Enter**

The color monitor will display:



JACK NICKLAUS
+2

Keyword Parameters must be declared at the start of a K program, using the command

`keyword` *$variable* `[=`*default*`]`

Let's modify the previous example so that the golfer's score is a keyword parameter that defaults to "even" if it's not specified:

```
# type 2-line lower third
# score defaults to "even"
keyword $score = "even"
<Erase-Text>
<Sel-1>; type $1; <New-Line>
<Sel-2>; type $score; <Center> 1
```

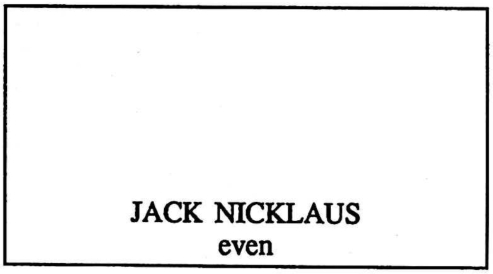
Now, typing

Do `golf "JACK NICKLAUS" score="+2"` **Enter**

would create the same display as before, while

Do `golf "JACK NICKLAUS"` **Enter**

would display:



JACK NICKLAUS
even

Flag Parameters are treated by K as a type of keyword parameter. A flag parameter is a keyword parameter that has only two possible values, 0 (false) or 1 (true). As with Do commands, use a leading hyphen for flag parameters:

`-flag`	sets the flag to 1
`-noflag`	sets the flag to 0

Let's add a flag parameter `-up` to the `golf` command, that forces the text into the upper left corner, instead of a lower third:

```
# type 2-line lower third
# or use -up for upper left
keyword $score = "even"
keyword $up = 0
<Erase-Text>
<Sel-1>; type $1; <New-Line>
<Sel-2>; type $score

if $up    # upper left
     <Center> t
     <Center> e
else      # lower third
     <Center> l
end
```

To display the score in the upper left corner, type

Do `golf "JACK NICKLAUS" -up` **Enter**

2.13 Returning from a K Subroutine

The `return` command forces an immediate termination of a K program:

`return [`*value*`]`

`return` can be combined with `if` to create a conditional termination:

```
if $key==<Compose>
     return
else
     ...
end
```

If a K subroutine is executing, `return` returns control to the calling K program. Additionally, the K subroutine may return a value to the calling program, which the calling program can assign to a variable. For example, this K program called `avg` that takes a number of golf strokes and a number of holes, and computes the average number of strokes per hole:

```
# compute strokes per hole
# format: avg holes strokes
$holes = 1.0 * $1       # convert integer to real
return $2/$holes        # return the average
```

We could then call this K program from another K program, and assign the result to a variable:

```
$average = avg 18 72
```

2.14 Exiting from a K Program

Another way to return from a K program or subroutine is to `exit` from it. The `exit` command forces all K programs to terminate.

If `exit` is used in a K subroutine, control *is not* returned to the calling program. All K programs cease executing, and the 20-K returns to Compose mode.

The `exit_option` command determines which program conditions will cause a K program to terminate.

`exit_option normal`	Terminates execution of a K program for these reasons: - system error message - **Quit** button pressed - `exit` command in program - normal program end
`exit_option cancel`	Terminates for all of the above conditions except a system error message.
`exit_option command`	Only terminates when an `exit` command is encountered. This is how you make a K program run forever so an operator can't cancel it.
`exit_option program`	Only terminates when K program ends normally.

2.15 Status Monitor Commands

Here are the K commands that control the black and white status monitor:

`cursor` *row column*

Position the cursor at the specified row (1 - 24) and column (1 - 64). Row 0 indicates the current row, and column 0 indicates the current column.

```
cursor 2 3     # row 2 column 3
cursor 0 3     # column 3 of current row
```

`newline` Position the cursor at the start of the next row.

`cursor_on` Turn on the cursor.

`cursor_off` Turn off the cursor.

`print` *param1* [*param2...*]

Display the specified parameters on the status monitor, separated by spaces.

K variables may be used as parameters. For string and keystroke variables, `print` simply types the string or keystroke. For integers and real variables, `print` converts the number to a string and types the string. Examples:

K PROGRAM	DISPLAYS
`print "hello"`	hello

`$a="one"`
`$b=2345`
`print $a $b`
	one 2345

`$a=22`
`$b="catch"`
`$c=$b%%$a`
`print $c`
	catch22

`message` *param1* [*param2*...]

Display the specified parameters on the message line of the status monitor, clearing the remainder of the message line. `message` uses the same K variable conversion rules as `print`.

`center` *param1* `[`*param2*`...]`

Display the specified parameters in the center of the current row of the status monitor.

`clear_line [`*row*`]`

Clear the indicated row of the status monitor. If no row is specified, clear the current row.

`clear` Erase the status monitor.

`status` *number* Suppress output to the status monitor, until K playback ends, or another `status` command is encountered. *HINT*: This command can be used to increase the playback speed of some K programs. Values for *number*:

0 = Normal, display all status updates and K prompts.
1 = Turn off status updates, but display K prompts.
2 = Turn off status updates and K prompts.

2.16 Control the Keyboard and K Playback

The following commands control interactions with the operator, as a K program executes. K playback can be suspended at any time, to allow an operator to respond to a question, trigger an effect, etc.

Some of the following K commands return a value, which may be an integer, real, string or keystroke. The returned value may be assigned to a K variable. We illustrate these commands like this:

COMMAND		RETURNS
`[`*$str=*`]`	*command*	string
`[`*$key=*`]`	*command*	keystroke
`[`*$int=*`]`	*command*	integer
`[`*$num=*`]`	*command*	integer or real

The playback control commands are:

`[`*`$key=`*`] getkey` Wait for a key to be pressed, return its value. Examples:

`getkey`	waits for a single key to be pressed. After you press any key, the K program continues.
`$a=getkey`	waits for a key to be pressed, and assigns it to variable `$a`.

`type` *`param1`* `[`*`param2`*`...]`

Type the specified parameters, as if an operator had typed those keys. `type` follows the same K variable conversion rules as `print` above.

The following example uses `getkey` and `type` to provide verify protection on <Erase-Text>.

```
# allow normal 20-K operation
# but verify erase text

loop                              # loop forever
   $key=getkey                    # get a key
   if $key!=<Erase-Text>          # is it erase?
      type $key                   # no, type it
      continue                    # go to top of
   end                            # loop
   message "Press y if you mean it"
   $verify=getkey                 # get verify key
   if  $verify == y               # was it a "y"?
      <Erase-Text>                # yes, erase
   else                           # no
      message "screen not erased"
   end                            # end of if
end                               # end of loop
```

`[`*`$num=`*`] getnum [`*`length initval`*`]`

Prompt operator for a number, and return that value. The prompt appears on the status monitor, at the current cursor location. The operator enters a number just like filling in a menu entry, then presses **Enter**. Input is restricted to the digits 0-9, +, - and decimal point. The optional parameter *length* specifies maximum number of characters in the input field. The input field is initialized to *initval*.

[*$str*=] `getstring` [*length inital*]

Prompt operator for a string, and return that value. The operator enters the string, then presses **Enter**. The optional parameter *length* specifies the maximum number of characters in the input field. The input string is initialized to *inital.*

`user`

Suspend the currently executing K program and return control to the keyboard. The K program resumes execution when the operator presses **End-Input.**

`wait` *seconds* [*fields*]

Suspend execution of the currently executing K program for the specified amount of time. Examples:

```
wait 2          # wait for two seconds
wait 0 30       # wait for thirty fields
                # (1/2 second)
```

HINT: Use `wait 0` to force the color displays and status monitor to update.

`trigger` *number*

Wait for the specified GPI trigger to be closed. User 1 is assigned trigger 1, User 2 gets trigger 2; triggers 3 and 4 are not yet enabled.

`user_func`

Return control to the user until the current function completes. Typically, `user_func` is used during a playback effect, to allow the operator to start the effect manually, or to change speeds on the fly:

```
<Effect> w      # program for scan wipe
user_func       # let user select speed
```

`user_func` can also be used to allow an operator to fill in a menu. Example:

```
<Font> e        # enter font edge menu
user_func       # let user fill it in
```

The operator moves the cursor up and down and fills in the menu entries. When the operator presses **Enter**, control returns to the K program.

`k_func` Continue executing K program during a real-time effect. Normally, K programs stop while an effect is in progress, so that a playback speed can be entered from the keyboard. This is not always desirable. In the following example, K starts playing `myanimation` at speed 2, then switches to speed 8 after 3 seconds.

```
<Effct> a myanimation <Enter>

k_func; 2      # start at speed 2
wait 3; 8      # after 3 seconds, speed 8
user_func      # wait for animation to end
```

2.17 Serial Input and Output

The following K programs control input and output through the 20-K's four serial ports. See also the Do command `setport`, in Chapter 11.

`[`*$int=*`] getport` *application*

Return the port number that has been configured for *application.* Valid applications are listed under the Do command `setport`, under the Usage parameter. They include `kbd`, `host`, emem, etc.

`[`*$str=*`] input` *portnum* `[`*length*`] [`*terminator*`]`

Input data from the specified port, and return its value as a string. Stop taking input when *length* bytes or a *terminator* character is received. *Length* defaults to 1. If *terminator* is not specified, the command waits until exactly *length* bytes are received.

`output` *portnum param1* `[`*param2...*`]`

Output the specified parameters as ASCII strings via the specified port. Uses the same K variable conversion rules as `print` and `type`.

`clearinput` *portnum*

Clear the input buffer for the specified port.

`[`*$int=*`] testinput` *portnum*

Return 1 (TRUE) if input is available on specified port, otherwise return 0 (FALSE).

2.18 Type Conversions

Use the following commands to turn a character string into a number, and vice versa.

`[`*$num=*`] asc2num` *string*

Convert a string to an integer or real number, and return the number. Example:

```
$a= "123"             # $a is a string
$b= asc2num $a        # $b is integer 123
```

`[`*$str=*`] num2asc` *number*

Convert a real or integer number into a character string, return the string. Example:

```
$a= 123.45            # $a is a real
$b= num2asc $a        # $b is string"123.45"
```

`[`*$int=*`] str2num` *string*

Convert a text string of up to 4 characters into the (concatenated) ASCII values of that string. Example:

```
$a= "ab"              # $a is a string
$b= str2num $a        # $b is an integer
type $b               # types: 24930
```

`[`*$str=*`] num2str` *number*

Convert up to 4 bytes of binary data into an ASCII text string. Example:

```
$a= 6382179           # $a is an integer
$b= num2str $a        # $b is a string
type $b               # types: abc
```

`[`*$int=*`] integer` *number*

Convert real to integer by truncation, return integer value. Example:

```
$a = integer 3.9
type $a        # types: 3
```

2.19 String Operators

The following commands operate on character strings. K defines "character position 1" as the first character in a string.

[*$str=*] `substr` *string position* [*length*]

Return substring of specified string. If *length* is not specified, return remainder of string. Examples:

```
$a = "abcde"
$b = substr $a 3 2
type $b             # types: cd
$c = substr $a 3
type $c             # types: cde
```

[*$int=*] `index` *string1 string2*

Return starting position of the first occurrence of *string2* in *string1*. Return 0 if *string2* does not occur in *string1*. Examples:

```
$a = "abcde"
$a = index $a "bc"
type $a             # types: 2
$a = index $a "xyz"
type $a             # types: 0
```

[*$int=*] `length` *string*

Return the number of characters in a string. Example:

```
$a = length "abcde"
type $a             # types: 5
```

2.20 K Commands by Category

Here is a brief description of each of the K commands, arranged by category:

Loop and Conditionals

`loop`	Repeat a section of a program.
`end`	Terminate an `if`, `loop`, or `while`.
`if` `else`	If condition is true, execute a section of a program, otherwise execute a different section.
`while`	While condition remains true, continue executing a section of a program.
`continue`	Return to the top of a `while` or `loop`.
`break`	Break out of `while` or `loop`.

Variables, Subroutines and Parameters

`global`	Define a global variable.
`free_globals`	Remove a global variable.
`keyword`	Define a K subroutine keyword parameter.
`return`	Exit from a K subroutine.
`exit`	Terminate a K program.
`exit_option`	Select options for `exit`.

Status Monitor

`cursor`	Position the cursor.
`newline`	Advance cursor to start of next line.
`cursor_on`	Turn on status monitor cursor.
`cursor_off`	Turn off status monitor cursor.
`print`	Display text on status monitor.
`message`	Display text on message line of status monitor.
`center`	Center text on current line of status monitor.
`clear_line`	Clear a line of status monitor.
`clear`	Clear the status monitor screen.
`status`	Restrict status monitor prompting.

Serial Input and Output

`getport`	Return port number of a specific application.
`input`	Input from one of the serial ports.
`output`	Output to one of the serial ports.
`clearinput`	Clear input buffer for a port.
`testinput`	Test a serial port.

Type Conversions

`asc2num`	Turn a character string into an integer or real.
`num2asc`	Turn an integer or real into a character string.
`str2num`	Turn a string into the numeric value of that string.
`num2str`	Turn a binary number into a character string.
`integer`	Return integer part of a real number.

String Operators

`substr`	Return a substring within a character string.
`index`	Find a string within another string.
`length`	Return the length of a string.

Keyboard control and K playback

`kdrive`	Specify the drive where K programs live.
`getkey`	Input a single keystroke from the keyboard.
`type`	Type a key.
`getnum`	Input a number from the keyboard.
`getstring`	Input a string from the keyboard.
`user`	Suspend K playback, return control to user.
`wait`	Suspend K playback, wait a specified time.
`trigger`	Wait for GPI trigger.
`user_func`	Suspend K playback, until effect or menu is done.
`k_func`	Don't wait for the end of the effect, continue executing K program.

2.21 System Variables

K programs have access to certain 20-K system variables. The first character of these variables is always an "at sign," so we call them ***at sign variables***. They are:

NAME	TYPE	EXAMPLE	DESCRIPTION
`@version`	string	`"2.0"`	Program version
`@pgmdate`	string	`"May 27, 1989"`	Program date
`@date`	string	`"Sat May 27 1989 12:53:54"`	Current date and time
`@mdrive`	string	`"1"`	Current message drive
`@fdrive`	string	`"2"`	Current font drive
`@pdrive`	string	`"1"`	Drive program was booted from
`@subsys`	keystroke	`<Cgen>`	Current subsystem: `<Cgen>`, `<Paint>`, `<Graph>`
`@mode`	keystroke	`<Compose>`	Current mode: `<Compose>`, `<Do>`, `<Pal>`, etc.
`@dots`	integer	`670`	Number of pixels on one scan line
`@lines`	integer	`486`	Number of visible scan lines
`@leftsafe`	integer	`76`	Pixel (dot) number of left side of safe title area
`@rightsafe`	integer	`603`	Pixel (dot) number of right side of safe title area
`@topsafe`	integer	`48`	Scan line number of top of safe title area
`@botsafe`	integer	`437`	Scan line number of bottom of safe title area

NAME	TYPE	EXAMPLE	DESCRIPTION
`@preview`	integer	`0`	`1` if 20-K is in black and white preview mode, else `0`
`@wordwrap`	integer	`1`	`1` if wordwrap is enabled, else `0`
`@insert`	integer	`1`	`1` if insert is enabled, else `0`
`@interleave`	integer	`1`	Iomega disk interleave value: `1, 4`
`@oddfield`	integer	`1`	`1` if effects should start on odd field, `0` if even field
`@selector`	integer	`1`	Current selector number (1-8)
`@selkey`	keystroke	`<Sel1>`	Current selector key
`@selfont`	integer	`1024`	Font number of current selector
`@cursorfont`	integer	`1024`	Font number of character under text cursor
`@cursorchar`	integer	`41`	ASCII code of character under text cursor, `-1` if there is no character
`@cursorword`	string	`"pretty"`	Character string of the word under the text cursor
`@hue`	integer	`240`	In **Pal**, current color's hue
`@saturation`	integer	`999`	In **Pal**, current color's saturation
`@value`	integer	`999`	In **Pal**, current color's value
`@red`	integer	`255`	In **Pal**, current color's red value
`@green`	integer	`255`	In **Pal**, current color's green value
`@blue`	integer	`255`	In **Pal**, current color's blue value
`@Y`	integer	`100`	In **Pal**, current color's Y value

NAME	TYPE	EXAMPLE	DESCRIPTION
`@U`	integer	`20`	In **Pal**, current color's U value
`@V`	integer	`-20`	In **Pal**, current color's V value
`@opacity`	integer	`100`	In **Pal**, current color's opacity
`@horizpaint`	integer	`0`	`1` if "painting" scan lines (**Bkgd P**), else `0`
`@horizline`	integer	`150`	scan line number that "paint" cursor is on (**Bkgd P**)
`@kbdport`	string	`"A"`	Port ID of the current keyboard's serial port
`@infield`	string	`"foo"`	The character string in the current menu entry field
`@key_avail`	integer	`1`	`1` if a keystroke is available from keyboard, `0` if not

K-series Video Digitizer

May 10, 1990

Software Version 2.0

Dubner Computer Systems

6 Forest Avenue
Paramus, NJ 07652

A Grass Valley Group Company

1. INTRODUCTION

The Dubner K-series Video Digitizer is an outboard accessory to the 20-K. It converts a black and white video signal into a 20-K background (ppic), which can then be colored or turned into a font character. You can record this ppic on the disk for future recall, or you can use it to create custom fonts.

WARNING: The K-series Digitizer requires black and white video input. Attempting to digitize a color signal may introduce noise and give undesirable results.

This manual provides the installation and operating procedures for the K-series Video Digitizer. If you have any questions about installation or operation, please call us at 201-845-8900. Our international customers, please call your local Grass Valley representative.

2. UNPACKING

Before unpacking, inspect the shipping carton for external damage. If any damage has occurred in transit, contact your Grass Valley sales representative and/or Dubner Computer System's shipping department immediately. Unpacking any package which is obviously damaged may result in a much more complicated situation than just trying to get a damaged machine to operate.

If there is no apparent damage open the package to make sure you have all of the following:

- The Digitizer
- Two rear side-rails (each 18 inches, 45.72 centimeters) with five counter sink holes
- Plastic bag containing
  - AC power cord
  - Interface cable from 20-K to digitizer (10 feet, 3.39 meters long)
  - 2 rear rack-mounts

3. OPERATING ENVIRONMENT

The K-series Digitizer occupies a single rack unit of space. However, do not mount another unit above the digitizer, unless you leave one or two rack spaces between them.

The digitizer isn't finicky about its temperature and humidity environment. An area hospitable to the 20-K will be fine for the Digitizer.

Temperature range:	0-60 degrees C
Humidity range:	5-95% non-condensing

4. RACK MOUNTING

If you don't intend to rack-mount your digitizer, go on to Section 5, "Connecting the Digitizer."

The K-series Video Digitizer mounts in a standard 19 inch (48.3 centimeter) rack.

To mount the digitizer:

1. Remove the three flat head screws from either side of the digitizer.
2. Using these three flat head screws, mount the rear side-rails to the digitizer.
3. Attach the two rear rack-mounts to the rear of the rack.
4. Slide the digitizer into the rack. The rear side rails should slide into the rear rack-mounts.

5. CONNECTING THE DIGITIZER

The back panel of the Digitizer has five connectors. They are, left to right, `POWER`, `CAMERA IN`, `MONITOR OUT`, `MAIN` and `AUX`.

`POWER`	requires 110 VAC +/- 10% @ 60 Hertz, 1 amp time delay fuse, (220 VAC +/- 10% @ 50 Hertz, 0.5 amp time delay fuse). NTSC units are set at the factory for 110v, while PAL units are set for 220v. (When the power is set for 220v, it is indicated on the rear of the power connector.) If this does not meet your local power requirements, remove the top cover and change the power supply voltage switch located on the rear of the power connector.
`CAMERA IN`	gets connected to the composite video output of your camera, or any other monochrome video source. An external sync generator is not required.
`MONITOR OUT`	is a composite video output. Connect it to a standard monochrome monitor.
`MAIN`	is the serial I/O line from the Digitizer to the 20-K. Connect this port to one of the four serial ports on the back of the 20-K, using the supplied serial cable. Plug the end labeled `DIGITIZER` into `MAIN`.
`AUX`	is provided for possible future use and is not implemented in the current software.

20-K to Digitizer RS 422 Cable

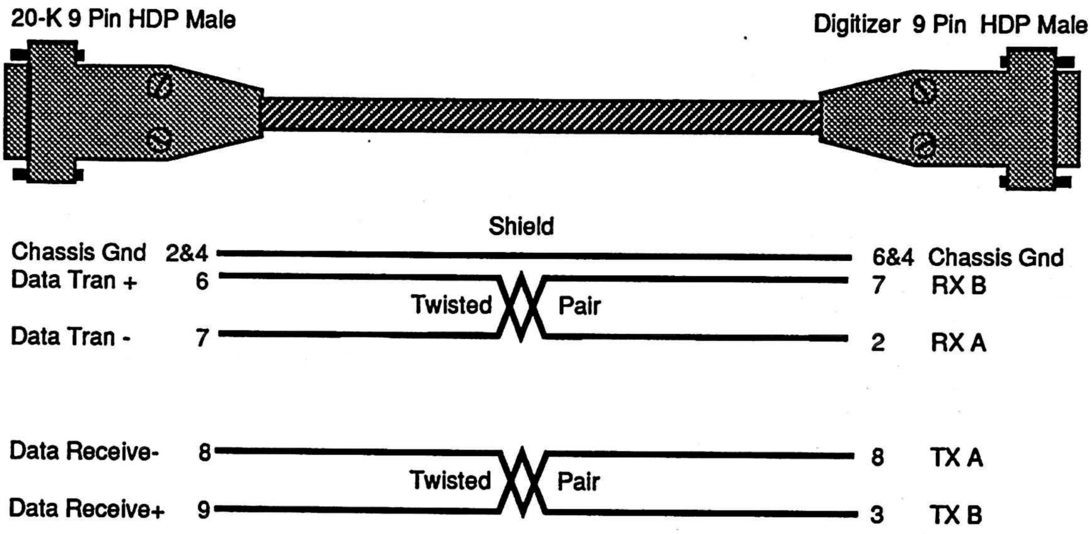

20-K 9 Pin HDP Male
Digitizer 9 Pin HDP Male
Shield
Chassis Gnd 2&4
Data Tran + 6
Data Tran - 7
Twisted
Pair
6&4 Chassis Gnd
7 RX B
2 RX A
Data Receive- 8
Data Receive+ 9
Twisted
Pair
8 TX A
3 TX B

Figure 1. 20-K to Digitizer RS 422 Cable

6. CONFIGURING A 20-K PORT

On the 20-K, press **Confg P** and move the cursor to highlight the port that you connected to the Digitizer. Press **Next** and **Prev** to set the port configuration to:

Port	Protocol	Baud Rate	Bits	Parity	Stop Bits	Handshake	Usage	User
C	RS-422	19200	8	None	1	X-OUT	DIGITIZE	USER1 or USER2

Menu 1: Port Configuration for the Video Digitizer

Press **Confg Y S** to save the port configuration on the selected message disk. In this example, we connected the Digitizer to Port C.

Config

RS 422

Digitize Off

A	RS-422	9600	8	Odd	1	None	Keyboard	On
B	RS-232	9600	"	None	1	"	Wacom	On
C	RS 422	19200	"	"	1	X-Out	Digitize	On
D	RS-232	9600	"	"	1	None	Pad	Off

7. DIGITIZER CONTROL PANEL

The front panel contains the following controls and indicators, from left to right:

BLACK	sets the input signal level which is considered black by the A/D converter. Anything below this level will also be considered black.
WHITE	sets the input signal level which is considered white by the A/D converter. Anything above this level will also be considered white.
EXT VIDEO	indicates the presence of a video signal on the CAMERA IN connector, and that the Digitizer is locked to it.
INVERT/GRID FREEZE/THAW TEST/MODE	These three push buttons control the Digitizer independently of the 20-K. We'll describe them in a moment.
POWER	This indicator is driven from the 5 volt DC logic supply.

When you power up the Digitizer, it performs a series of self-tests, then leaves a test pattern on the monitor screen. When you see the test pattern, the Digitizer is ready to use.

Normally, the only things you need to adjust on the Digitizer are the BLACK and WHITE levels. Everything else is controlled remotely from the 20-K. To use the other controls, see Section 11, "Stand-alone Digitizer."

8. SETTING UP THE CAMERA

- Connect a black and white video signal to the Digitizer's `CAMERA IN` jack.
- Connect the `MONITOR OUT` to a black and white monitor.
- Turn on the camera and Digitizer and place the artwork to be captured under the camera. Use a copy stand or tripod to hold the camera steady.
- Press the button labeled `FREEZE/THAW` on the Digitizer once to see the image in live video on the black and white monitor.
- Focus the image by adjusting the lighting and the camera F-stop for the clearest image possible. If you set up the lighting and focus the camera carefully, you have to make only minimal adjustments to the Digitizer.

The `BLACK` and `WHITE` level controls set the Digitizer's grey scale to cover any portion of the input video signal's range. These controls interact with the subject lighting and the F-stop setting on the camera. Experience proves the best teacher here. As a general rule, however, there are two kinds of digitizing you are most likely to be doing: Font creating and Background creating. Each requires slightly different procedures.

9. CAPTURING A FONT

To capture a font, keep the lighting of the subject matter as even as possible. You'll get the best results when there are no "hot" spots in the image. Start with the Black level all the way down, (fully counter/clockwise) and the White level all the way up (fully clockwise). With the Digitizer thawed, adjust the camera and lighting for the most evenly illuminated image possible. When you are satisfied with the lighting, adjust the Digitizer's `BLACK` and `WHITE` knobs so that the black and white areas of the image are uniformly black and white.

Assuming that the character is black and the background is white, the interior of the character should be fully black, and the background should be fully white.

The Digitizer provides a *natural* anti-aliasing of the font. Control the amount of anti-aliasing by adjusting the Black and White levels. The closer the Black and White levels are to each other, the sharper and jaggier the character boundary will be. This anti-aliasing will be reproduced exactly on the 20-K; no additional software anti-aliasing will be done (unless you use **Font A**). See the 20-K User's Guide, Section 9.3, "Scaling Fonts."

To capture a character from the Video Digitizer (See the 20-K User's Guide, Section 9.6, "Creating a Custom Font."), first press **Font H.** Press **Prev** or **Next** to choose `Font Source-> Video Digitizer` from the character capture menu.

Four horizontal and two vertical lines appear on the Digitizer's black and white monitor:

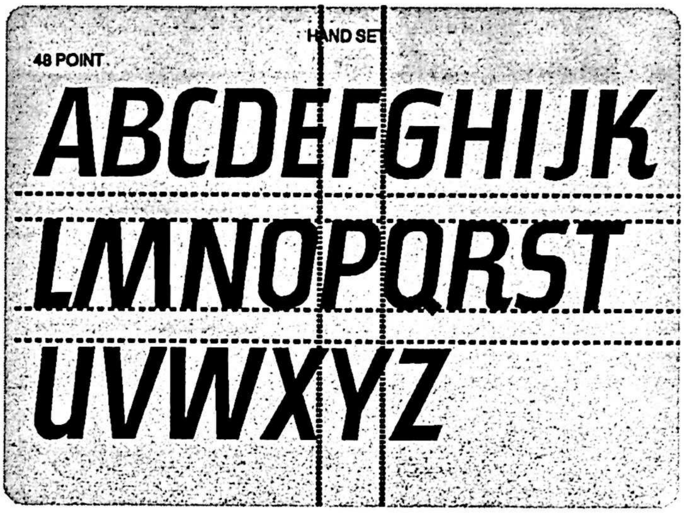


Figure 2. Character Capture Guide lines (Digitizer)

The inner top line is only used to adjust the camera height or zoom so that the characters are the proper height (an upper case "H" should fit between the inner top and inner bottom lines). Everything between the outer top and outer bottom lines and the left and right vertical lines (the "Box") is digitized and captured. The software ignores blank spaces above and below the character.

When you type the corresponding keyboard character, the selected character is digitized in the same relative position it had in the full digitized image. Press **Home** to make any adjustments.

Press **Enter** when you're satisfied with the result. Repeat this process as many times as necessary. Scale fonts with **Font A**, edge them with **Font E**, and assign colors to them from Palette mode.

10. CAPTURING A BACKGROUND

When creating a background, the rules about camera and lighting mentioned above still apply, although here the objective usually is to obtain the closest approximation to the original image as possible. In this case, turn up the `BLACK` level just to the point where the darkest areas of the image become black; turn the `WHITE` level down so that the lightest areas just become white. Here, your judgment is probably the most important factor. Adjust the controls to enhance the detail in certain areas or to create effects.

- Since the `BLACK` level control affects the `White` level, adjust this control first.

- Take great care to adjust the camera and lighting properly.

- The higher the `BLACK` level is set, (and the lower the `WHITE` level is set,) the greater is the possibility that noise creeps into the picture. The gain of the A/D circuit increases as the black and white levels approach each other. Therefore, keep the `BLACK` level as close to minimum (counter/clockwise) and the `WHITE` level as close to maximum (clockwise) as you possibly can. Always adjust the camera's f-stop and the lighting first, and use the `BLACK` and `WHITE` controls as a last resort.

Press **Bgd D**. Displays the following menu:

```
                    BACKGROUND CAPTURE WITH DIGITIZER

     Record name->

     Output drive->
```

Menu 2: Background Capture with Digitizer

`Record name`	The digitized image will be automatically recorded at this message name. Use [↓] to move to the next parameter:
`Output drive`	The digitized image will be recorded on this drive.

When you've made your selections, press **Enter.** Two horizontal and two vertical lines appear on the Digitizer's black and white monitor over the image to be digitized.

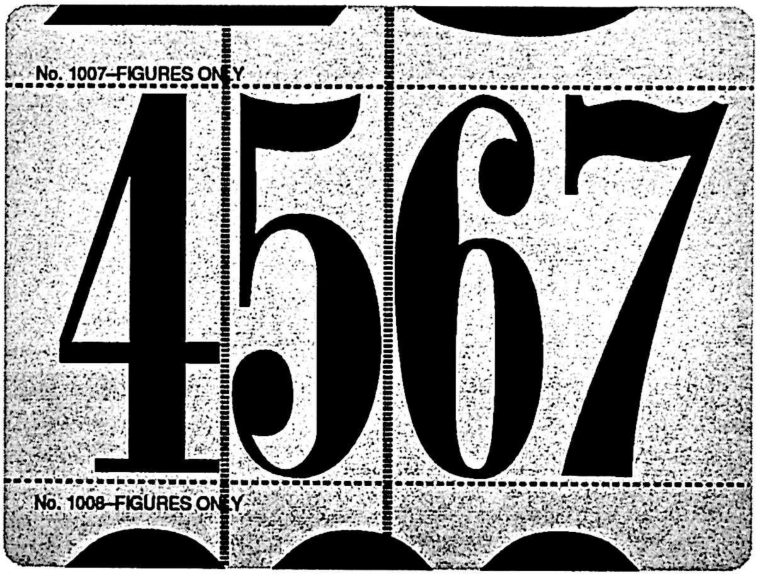


Figure 3. Background Capture Guidelines

To digitize only a portion of the screen (the Box) move the lines on the black and white monitor until the part you want to digitize is enclosed by the lines.

These keystrokes move the lines:

Shift-Char [↑] [↓]	Move the top line in the indicated direction.
Shift-Row [↑] [↓]	Move the bottom line in the indicated direction.
[←] [→]	Move both vertical lines in the indicated direction.
Shift-Char [←] [→]	Move the left vertical line in the indicated direction.
Shift-Row [←] [→]	Move the right vertical line in the indicate direction.
Insrt	Return the Box to the original position.
Compose	Return to Compose mode.

The numbers at the bottom of the menu screen indicate the position of the lines as well as the height and width of the box they form.

Enter	Digitize the selected part of the image and record it at *Record name.*
Home	Digitize the entire image (ignoring the lines) and record it at *Record name.*

11. STAND-ALONE DIGITIZER

The Digitizer also functions as a stand-alone unit, without the 20-K. Use the three front panel buttons to control the Digitizer:

`FREEZE/ THAW`	toggles the Digitizer between `FREEZE` mode and `THAW` mode. In `THAW` mode, live video passes through the Digitizer, and is continuously digitized. In `FREEZE` mode, a single frame is grabbed and held in the Digitizer's memory. `FREEZE/THAW` also controls the mode of the other two push buttons. In `FREEZE` mode, the buttons perform the top function; in `THAW` mode, they perform the bottom function.
`TEST/ MODE`	In `FREEZE` mode, creates a test pattern in the Digitizer's memory. In `THAW` mode, toggles back and forth between `BOX` and `GRID`. See below.

`INVERT/ GRID`	In `FREEZE` mode, inverts the stored video image (i.e., turns black into white and white into black). In `THAW` mode, this button's function depends on whether the Digitizer is in `BOX` mode or `GRID` mode. In `BOX` mode, the size of the box increases by 10 lines each time you press the button (the initial size is 10x10). After a maximum of 350 lines (400 lines PAL), the box size resets to 10x10. In `GRID` mode, cycles the Digitizer through the four grid choices (OFF, 64 line, 32 line, 16 line). The initial state is OFF.

Boxes isolate a portion of the background to be digitized. While the digitizer always captures the full screen, the box tells it how much of the image to transfer to the 20-K. The smaller the box, the quicker the transfer. Normally, use the 20-K to control the box size; it's easier.

Grids are a series of horizontal lines superimposed over a thawed image by the Digitizer hardware. The lines appear only on your output monitor; they are not digitized when you `FREEZE`. In `THAW` mode, press `TEST/MODE` to toggle between grids and boxes. Press `INVERT/GRID` to change the grid size.

When connected to the 20-K, the Digitizer is always "on-line", that is, the 20-K can always issue it a command, which is given priority over the front panel buttons.

The K-Paint System

May 10, 1990

Software Version 2.0

Dubner Computer Systems

6 Forest Avenue
Paramus, NJ 07652

A Grass Valley Group Company

1. INTRODUCTION

The K-Paint system creates ppics, logos and special fonts. The character generator then displays them. K-Paint draws anti-aliased pictures and fills them with color. It changes on-screen colors, creates interesting textures (including color ramps), and draws simple geometric shapes. You can record the drawings you make, read them back to modify them further, or apply textures from the drawings onto characters. The software produces the best quality images possible within the range of 256 colors out of 16 million.

K-Paint is available with the K-series black and white Video Digitizer in a keyboard-only version as well as a digitizing tablet and pen version. The pad (tablet and pen) is faster, more convenient and certainly makes free-hand drawing easier. K-Paint works with the keyboard, the optional pad, or both; pad owners can also use the keyboard.

This manual describes K-Paint pen motions and keystrokes. We type keystrokes in a big fat font (**Compose**). Most functions can be initiated by both the keyboard and pad; exceptions are so noted.

Status monitor announcements and prompts are typed in a newspaper-like font (`1-PAINT`).

To configure and install the pad, see Section 5, "Installing the Pad."

1.1 Starting K-Paint

The K-Paint system operates on whatever ppic is currently displayed.. If a text message is on-screen, K-Paint weaves it to become a ppic. In Compose mode, press **Paint**. **Paint** is on the upper left-hand corner of the keyboard. (The **Paint** button is near the **Help** button. **Confg O** is a toggle that enables/disables **Paint** when on-air, to prevent users from inadvertently entering K-Paint.)

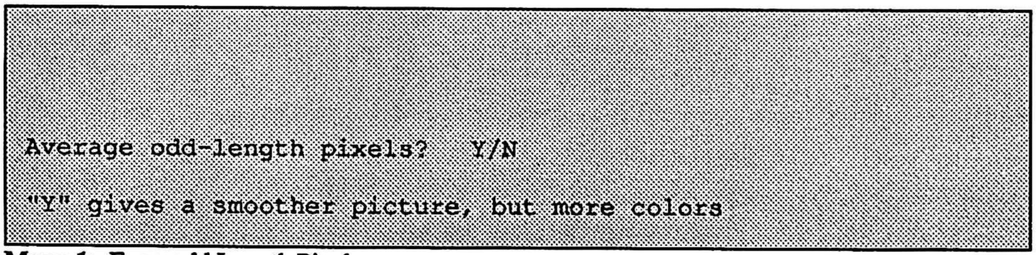
Paint or **Bkgd P**

enters the K-Paint system.

If the message `Pad not configured` appears, the pad hasn't been properly installed, or this option is not enabled for your machine. Call us at 201-845-8900 for help. Our international customers, please contact your local Grass Valley representative.

Before you call, take a minute to jot down your program version, date and `SIN` number. You'll find them on the top third of the status monitor display whenever you boot up. Use a telephone within reach to help us serve you better.

K-Paint converts the ppic so that every pixel has two dots. If there are odd-length pixels, the status monitor prompts:



```
Average odd-length pixels?  Y/N

"Y" gives a smoother picture, but more colors
```

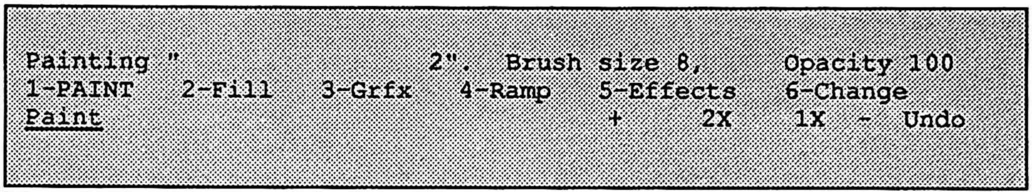
Menu 1: Even-odd Length Pixels

y	Averages the color of the extra dot at the end of an odd length run with the color of the first dot of the run. This results in a good-looking picture, but uses extra colors.
n	(or any letter other than y) Makes the odd length run even, extending the run by one pixel and *borrowing* from the run to the right. This uses fewer colors, but create a slightly jaggier picture.

You usually want to select "n." After some initial picture processing, the K-Paint menu appears on the status monitor.

1.2 The K-Paint Menu

The K-Paint menu occupies the top three lines of the status monitor. The top-most line contains the name of the current ppic and some data about the current brush. The middle line lists all the main menu functions, and the bottom-most line lists sub-menu commands. For instance, you might see:



```
Painting "                2". Brush size 8,    Opacity 100
1-PAINT   2-Fill   3-Grfx   4-Ramp   5-Effects   6-Change
Paint                                  +    2X    1X  -  Undo
```

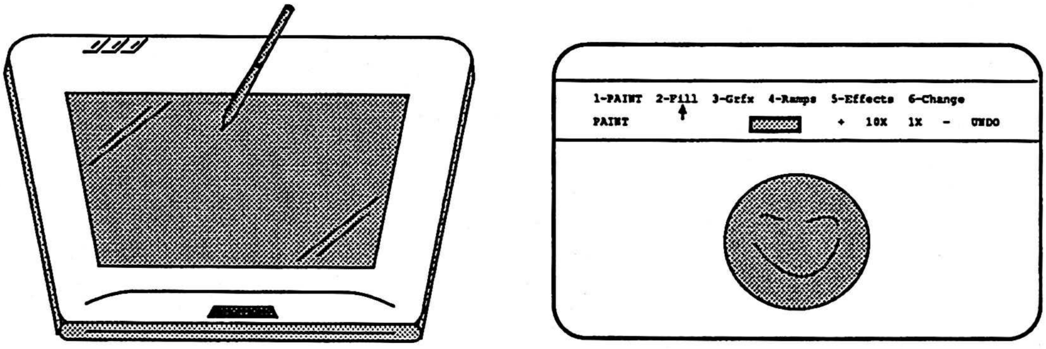
Menu 4: Top Three lines of the Status Monitor

The top line tells you that you are in the painting sub-system working on ppic "2" and are using a fully opaque brush 8 scan-lines high, with an opacity of 100.

The main menu line tells you that you are painting (i.e. not doing some kind of fill).

The magnification indicators are at the right of the main-menu line. We list the magnification control keystrokes in Section 1.4, "Pan and Zoom."

To reach the main and sub-menus from the pad, move the pen up above the top of the picture. The menu lines appear over the on-air picture. Press down to select a main menu function or a different sub-menu function. An arrow appears at the selected function.


1-PAINT 2-Fill 3-Grfx 4-Ramps 5-Effects 6-Change
PAINT
+ 10X 1X - UNDO

On-air Monitor

Figure 4. The Pad with Menu

To remove the main menu, move the pen down to the picture. Unlike other Dubner paint systems, there are no "swipes."

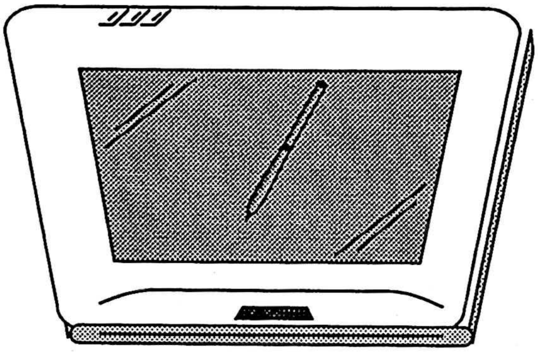
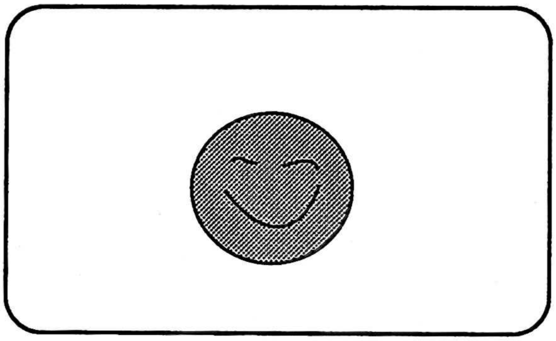


Figure 5. The Pad with No Menu



On-air Monitor

To use the menu from the keyboard, move the cursor with [→] [←] [↑] [↓]. As you move the cursor right or left along the main menu line, the status monitor displays the sub-menu functions for each main menu entry or press the number associated with a main menu entry (such as 4 for Ramp); the cursor jumps immediately to that menu entry. Press **Alt** along with a number, and the cursor jumps to the corresponding sub-menu entry.

[↓]	moves from the main menu to the sub-menu
[↑]	moves from the sub-menu to the main menu.
[↓]	moves down from the sub-menu line. The cursor moves to the on-air monitor and you can paint or fill, etc. The function (e.g., `Painting`) is backlit.
Home	moves the cursor back to the main menu line.
Misc or **Effect**	selects the previous magnification
Disk Util or **Seq Play**	selects Dmag (1X)
Erase Bkgd	performs Undo

To start executing a function, move the cursor down off the sub-menu line. The selected function is highlighted.

Use `Undo` (**Erase Bkgd**) to erase mistakes. Every time you change the brush, K-Paint makes a copy of the current picture. (It flashes `Check point` on the status monitor.) If you modify the picture further, then select `Undo`, K-Paint copies the picture back and erases the new modifications. `Undo` is not protected from power failures or accidents, so record pictures you really like on the disk.

When the cursor is *not* on the picture (the pen is not in proximity—away from the pad about 1/2 inch—or the cursor is up on the status monitor menu), K-Paint automatically examines the ppic to see if colors that were formerly used have now been painted out. K-Paint reclaims those unused colors and announces how many colors remain and how many are reclaimed.

The following are main menu and sub-menu functions.

Main-menu	Sub-menu	Description
`1-Paint`	`Paint`	Paint with the current brush
`2-Fill`	`Border`	Fill to selected border
	`Area`	Fill specified area
	`Cel`	Fill to black border (Cel animation fill)
`3-Grfx`	`Line`	Draw straight lines with brush
	`Rect`	Draw rectangles with brush
	`Ellipse`	Draw ellipses with brush
`4-Ramps`	`Ramp`	Color ramp in RGB space
	`Left HUE`	Color ramp in HSV space (Move left along hue)
	`Right HUE`	Color ramp in HSV space (Move right along hue)
`5-Effects`	`MoveWrap`	Wrap-around ppic move
	`MoveReg`	Non-wrap around move
	`Link`	Combine identical RGB colors
	`Quant`	Quantize picture (usually to reduce the number of colors)
`6-Change`	`Global`	Change brush color for entire picture
	`Area`	Change color within area
	`Single`	Change single pixel color
	`Color`	Colorful color palette

1.3 The K-Paint Brush Palette

Use the palette to select new colors or make other modifications to the brush. The palette contains six sliding scales, some brush type and style selectors, and eight "paint pots" for storing colors. The large square colored (usually) area at the right end of the palette shows the current brush color. When you paint or fill, that's the color you get.

To enter/exit the palette:

From the Keyboard

Pal or **0**	Enters the palette. The cursor is on the Hue bar.
Pal or **0**	(again) Exits the palette.
Home	returns to the main menu

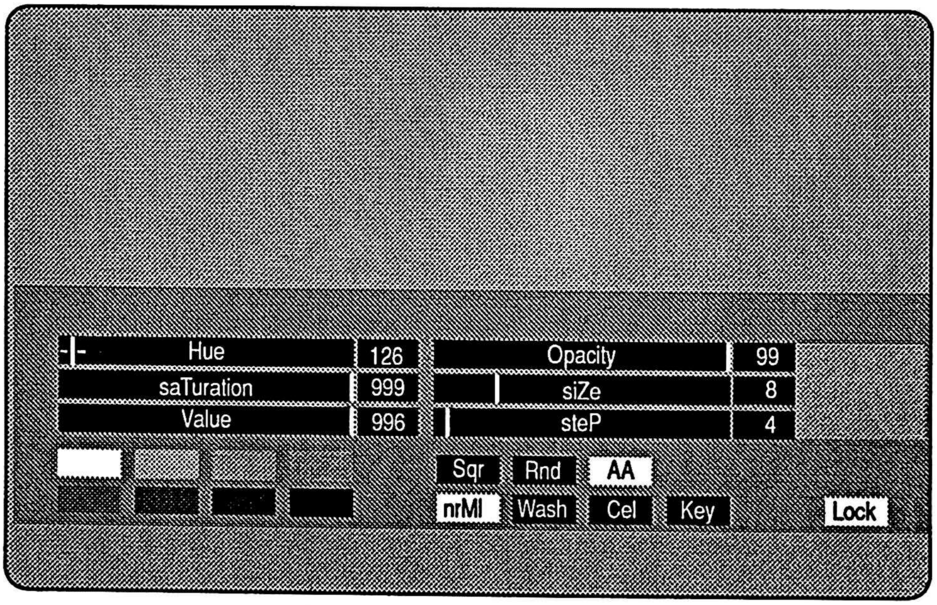

Hue
126
Opacity
99
saTuration
999
siZe
8
Value
996
steP
4
Sqr
Rnd
AA
nrMl
Wash
Cel
Key
Lock

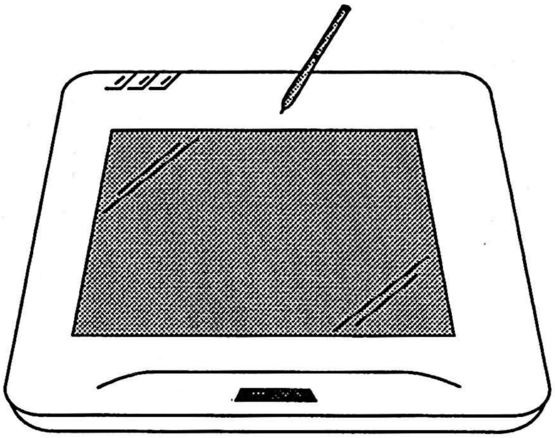
Figure 6. K-Paint Palette

From the Pad

Move the cursor to the top of the pad and press on the brush color square on the main menu (or use the **Pal** or **0** keys).

Repeat to exit the palette.

To move the palette, move the cursor to the brush color (the big square at the right of the palette). Press down and slide the whole palette up or down until it is out of the way. The palette stays there until you move it again.



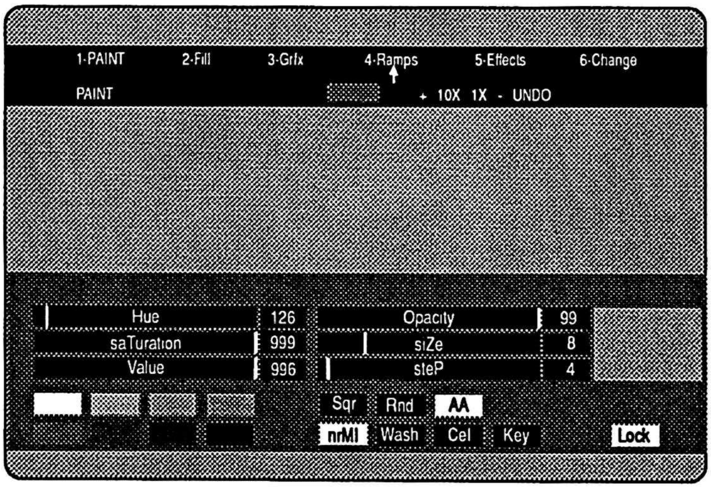
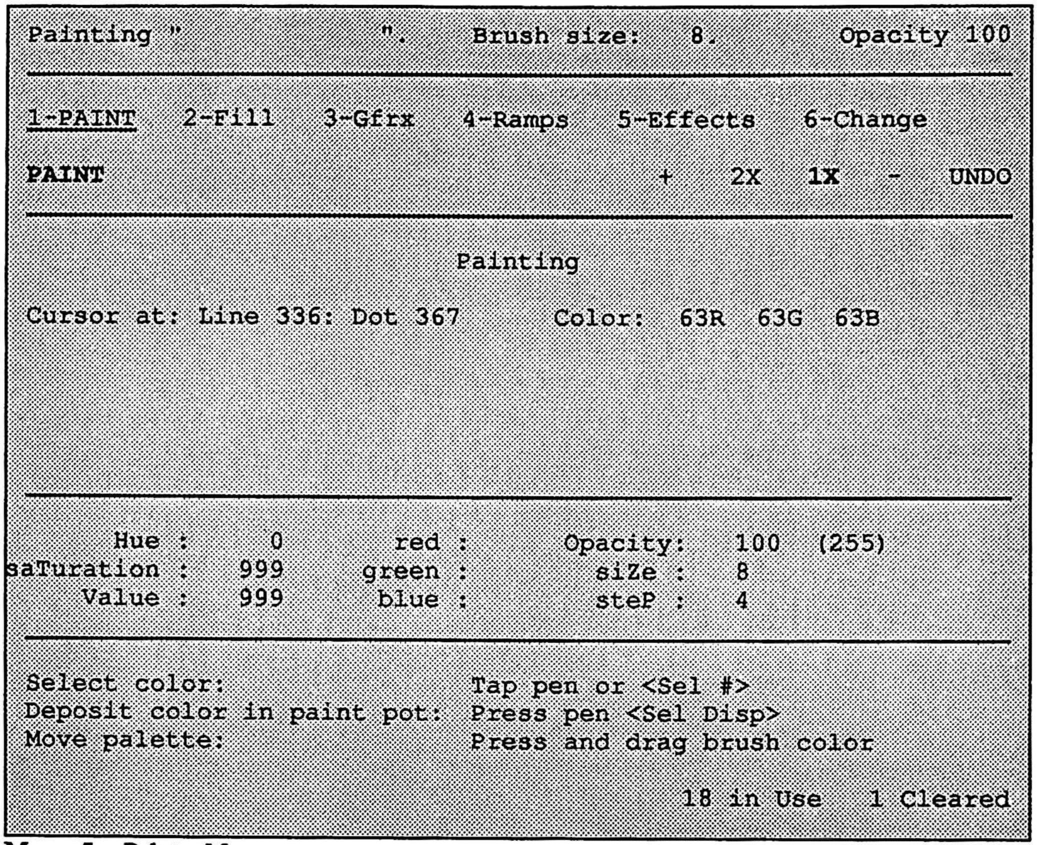

1-PAINT
2-Fill
3-Grfx
4-Ramps
5-Effects
6-Change
PAINT
+ 10X 1X - UNDO
Hue
126
saTuration
999
Value
996
Opacity
99
siZe
8
steP
4
Sqr
Rnd
AA
nrMl
Wash
Cel
Key
Lock

Figure 7. K-Paint Palette with Menu

The status monitor displays the Palette menu:



```
Painting "                 ".    Brush size:   8.        Opacity 100

1-PAINT   2-Fill   3-Gfrx   4-Ramps   5-Effects   6-Change

PAINT                                        +    2X    1X    -    UNDO

                              Painting

Cursor at: Line 336: Dot 367       Color:   63R   63G   63B




      Hue :      0       red :      Opacity:    100  (255)
saTuration :    999     green :        siZe :    8
    Value :    999      blue :        steP :    4

Select color:                    Tap pen or <Sel #>
Deposit color in paint pot:      Press pen <Sel Disp>
Move palette:                    Press and drag brush color

                                           18 in Use   1 Cleared
```

Menu 5: Palette Menu

Palette Scales are Hue, saTuration, Value, Opacity, siZe and steP.

Hue is an angle from 0 to 360 degrees on a color wheel, where red is 120 degrees, green is 240 degrees, and blue is 0 degrees. When the amounts of red, green, and blue are equal (a shade of grey), the hue is undefined.

Saturation is a measure of how "pure" a color is. A fully saturated color is 100% pure, with no white in it. Reducing the saturation adds white to the color; reducing the saturation all the way to 0 gives you a shade of grey, no matter what the hue is. The 20-K controls saturation using an arbitrary 0-999 scale, where 999 represents maximum saturation.

Value is the total amount of light present. It is similar to luminance or brightness. As with saturation, the 20-K uses an arbitrary 0-999 scale. Maximum value (999) implies that at least one of red, green and blue has the maximum setting (255). Reducing the value lowers red, green, and blue in equal proportion. A value of zero produces black, no matter what the hue and saturation are.

The ***Opacity*** scale controls the opacity of the brush. A 100% opaque normal brush paints over pixels. A 75% opaque brush mixes three quarters of the brush color with one quarter of the ppic color. A 0% opaque brush doesn't paint at all. See `Key brush` for variations.

Size controls the brush size from the minimum possible (1 for square brushes, 2 for round or anti-aliased brushes) to 31 scan lines high.

Step controls the distance between brush strokes. *Step* is set to give a smooth brush stroke whenever you select a brush *Size*. K-Paint will choose a smooth step amount. If you want to draw dotted lines, increase the step size and *then* change the step amount.

From the Pad

Move the cross-hair cursor to a scale and press down on the pen to select it.

From the Keyboard

[↑] [↓]	moves the cross-hair cursor to a another scale. From the Hue scale, [↑] exits the palette.
[→] [←]	sets the scales to the proper values.

Type the upper-case letter to reach a scale quickly.

Paint Pots

The palette has eight color receptacles aka ***paint pots***. They are at the lower left of the palette. You can save and recall specific colors in the paint pots.

From the Pad

Move the cursor over a pot and ***tap*** to transfer the color from the paint pot to the current brush color. To tap, press down and up deliberately, but quickly (less than 1/3 second). To place the brush color in a paint pot, move the cursor to the pot and press down until the pot color changes.

From the Keyboard

To move the cursor to a paint pot, press a Selector or **Text.**

Sel 1	Moves the cursor to pot 1.
Sel 2	Moves the cursor to pot 2 and so on.
[←]	
[→]	selects different pots.

With your cursor on a pot, press

Sel-Disp	puts the pot color in the current brush.
Enter	puts the brush color in a pot.
Bkgd	moves the cursor off the palette.
Sel-Disp	picks a color off the ppic and makes it the current brush color.
Text	returns the cursor to the last selected pot.
Shift-Char [↑]	
Shift-Char [↓]	moves the palette so you can see "under" it.

To examine the color already in a paint pot, move the cross-hair cursor over the pot and look at the RGB value on the status monitor.

Shapes and Styles

The palette has several brush shapes and styles. They are:

Shapes:

`1-Sqr`	The brush is square. This square brush is usually used for very detailed font fixing.
`2-Rnd`	The brush is round, but not anti-aliased. Color is painted in a round pattern for each brush stroke. This brush uses fewer colors than the anti-aliased brush, but strokes don't have smooth edges.
`3-AA`	The brush is round and anti-aliased. Brush strokes have smooth edges, but this brush type uses more colors to blend those smooth edges.

Styles:

`1-nrMl`	Paint is mixed with the ppic color. If the brush is opaque (opacity = 100%), the brush replaces the ppic color. (The `AA` brush creates translucent edge pixels.) If the brush is translucent, the brush color mixes with the ppic color depending on the opacity value.
`2-Wash`	The brush chroma (hue and saturation) replaces the ppic chroma. The ppic color value is unchanged. This is one way to add color to pictures—the overall luminance (value) of the picture does not change.
`3-Cel`	The Cel brush also adds color and is ideal for adding color to digitized ppics. Unlike the wash brush, however, it not only mixes the hue and saturation, but also mixes the value of the brush color with the ppic value. The value is the *value of the brush* if the ppic is white, *black* if the ppic is black, and *somewhere (linearly) in between* if the ppic is in between white and black. With this brush, for example, you can paint dark green onto a white ppic and still not destroy any black borders already there. Those borders may have been input from the black and white digitizer.

When `Cel` style is selected, the brush type is set to `Rnd`. Rnd is the best type for cel fill touch-ups. However, you can change the type to `AA` after you select `Cel`.

`4-Key`	The Key brush paints directly on the ppic key signal. The brush color is ignored and the opacity is translated directly into a key value that is *painted* into the picture. This permits translucency effects when the linear keyer is used to matte the ppic over an external video source.

It helps to turn the linear keyer on when you are using this brush so you can see what you are doing. Another useful trick is to feed the key signal into a black and white monitor. Press **Confg L** and mix an external video source with your ppic.

To change brush shapes and blend characteristics, select the shape and style at the lower right of the palette. You can select one brush shape (top line) and one blending style (bottom line) at any time:

From the Keyboard or Pad

To select brush types or blending styles, type the upper-case letter in the caption (**A** for `AA`—anti-aliased brush).

[→][←]	moves to one of the other types or styles.

From the Pad

Position the pen on a brush type or style and press.

Locked/Unlocked Palette

The palette can be either locked or unlocked. The palette is always locked when you paint with the keyboard. When you move the cursor to the ppic and press **Enter**, you will paint.

The palette can either be locked or unlocked when you paint with the pad. If `Lock` is backlit, the palette is locked; if `Lock` is not backlit, the palette is not locked. Move the Cursor over `Lock` and press the pen down to change lock states.

A locked palette stays on the screen until you remove it. When you move the cursor to the ppic and press down on the pen, you will paint.

With an unlocked palette you can move the cursor to the ppic, *pick up* a color from the ppic and make it a brush color. Move the cursor to the color you want, tap and the color is transferred to the brush color.

The palette goes away when you lift the pen out of proximity (away from the pad about 1/2 inch) or type **0** or **Pal** again. Then paint or perform other paint system functions.

1.4 Zoom and Pan

All paint system functions work with the screen magnified (***zoomed***). Once the screen is magnified, ***pan*** around to see any particular part of the picture. To magnify the picture, with either the pad or the keyboard, move the cross-hair cursor to an area and press **Next**. The screen is magnified one level. Initially, the picture jumps from 1X to 2X. Press **Next** as often as you want (up to 63). The magnification factor increments one level each time. Press **Prev -** to drop down one level.

From the Pad and Keyboard

Seq-Play or **Disk-Util**	demagnifies the picture all the way back to 1X.
Effect or **Misc**	remagnifies back to where you were the last time you demagnified.

From the Keyboard

+	magnifies up one level
-	demagnifies one level
1X	(if not lit) demagnifies
2X	remagnifies to (or whatever the remag factor is)

When the image is magnified, pan to see (and draw on) parts of the picture that are off-screen. Move the cross-hair cursor to the edge of the picture with the pen or with the cursor keys. K-Paint pans across the picture to get the cross-hair back into the center. Panning stops when you reach the edge of the (unmagnified) picture.

From the Pad

Keep the cursor at the edge of the pad for a second or two. K-Paint needs to make sure you really mean it.

From the Keyboard

Shift Char [→][←][↑][↓]
speeds up panning.

When you record a picture while it is magnified, K-Paint records the magnified image you see on the screen, not the entire picture. *What you see is what you get!*

2. K-PAINT FUNCTIONS

1-PAINT

Move the cursor to `PAINT`, then to Painting.

From the Pad

Press down when you want to draw. When the pen is out of proximity, the cross-hair cursor disappears. When the pen is in proximity, but not touching the pad, the cursor shows you where you are.

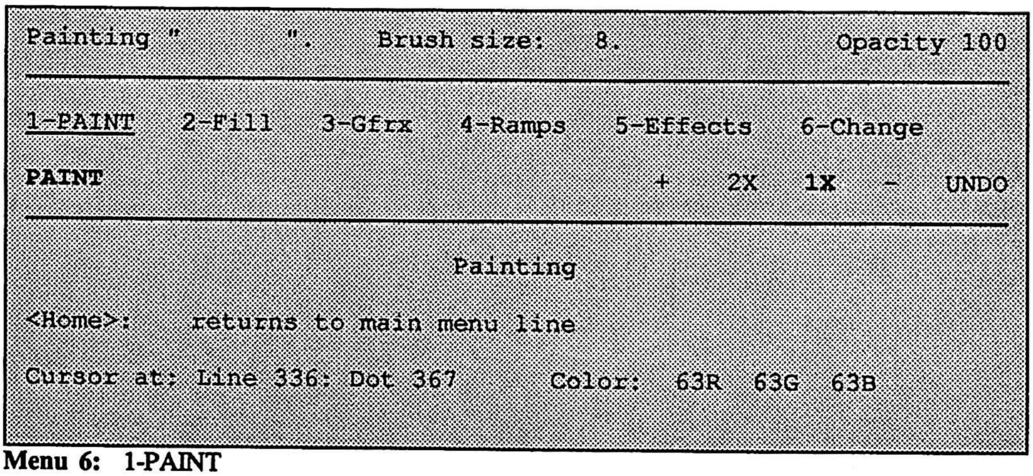
From the Keyboard

[→][←][↑][↓] moves the cursor.

Shift-Char [→][←][↑][↓]
moves the cursor more rapidly.

Enter lays down a brush stroke.

Shift [→][←][↑][↓]
draws horizontally or vertically ("Etch-a-sketch" mode).



```
Painting "          ".    Brush size:   8.               Opacity 100
---------------------------------------------------------------------
1-PAINT   2-Fill   3-Gfrx   4-Ramps   5-Effects   6-Change
PAINT                                       +    2X    1X    -    UNDO
---------------------------------------------------------------------
                              Painting
<Home>:    returns to main menu line
Cursor at: Line 336: Dot 367        Color:  63R  63G  63B
```

Menu 6: 1-PAINT

2-FILL

NOTE: Fills expect a closed border. If you attempt to fill a "U" shape, the fill cheerfully "leaks" and covers the entire screen.

There are four kinds of `FILL`.

- `Any Fill` fills to any painted border. Borders are created by painting. Since the fill stops as soon as it encounters a border, you don't have to designate a border. `Any Fill` ***is anti-aliased.*** `Any Fill` is similar in function to `Border Fill`, but the fill stops as soon any painted border is encountered.

- `Cel Fill` fills from a light area to a dark border. The `Cel Fill` fills the area starting from the designated pixel and continues until it finds a dark, closed border. `Cel Fill` is particularly useful for adding color to black and white digitized images.

- `Border Fill` fills an area within a closed border. The border is created by painting. If the border was painted with an anti-aliased brush (`AA`), the edges of the filled area are anti-aliased.

- `Area Fill` fills all pixels that have the same color and are contiguous with the pixel you designate as the starting pixel. (By contiguous, we mean next to horizontally or vertically, but not diagonally.) Since the fill stops when a different color is encountered, you don't have to designate a border. `Area fill` ***is not anti-aliased.***

`ANY [↓] Filling to Any Border`

Paints color inside any border.

K-Paint prompts:

```
Move cursor into area to fill
Then press pen or <Enter>
```

Filled pixels are *painted* with whatever brush style and color you are currently using. You can fill a border with a key signal (Key brush) or just color only (Wash).

Quit Clears entire screen

BORDER [↓] Filling to Painted Border

Paints color inside a closed border. The border need not be the same color as the interior fill color. The edge of the unmagnified picture counts as a border so you can fill outside a loop. `Border Fill` is similar to `Any Fill`, but the fill stops at the border you designate.

K-Paint prompts:

```
Move cursor to border
Then press pen or <Sel Disp>
```

K-Paint prompts:

```
Move cursor into area to fill
Then press pen or <Enter>
```

Quit if the fill goes awry. If the system is not actively filling, and if you have picked the wrong border or want to start over, **Quit** and the border fill restarts.

Filled pixels are *painted* with whatever brush style and color you are currently using. You can fill a border with a key signal (Key brush) or just color only (Wash).

AREA [↓] Filling Area

Paints the current brush color onto an area.

K-Paint prompts:

```
Move cursor into area to fill
Then press pen or <Enter>
```

`Area fill` does not change the color of anti-aliased edges of the area. Area fill only places the brush color into the area—this is the same as the `Normal` brush blend. Area fill does not use the fancier `Key` and `Cel` brushes.

`CEL [ ↓ ] Cell Fill`

Move the cursor to the *brightest* point inside the black or gray border.

K-Paint prompts:

```
Move cursor into area to fill
Then press pen or <Enter>
```

K-Paint paints the area with the current brush color and blending style (although cel fills work best, key fills are also useful). `Cel` stops in the middle of the nearest dark border. Some pixels may be untouched if the borders are ill-defined. Switch to `Paint` and touch up any holes.

Quit if the fill starts to leak. To close *holes*, just paint.

For best results, select the `Cel brush` when you use `Cel Fill`. Any anti-aliasing present in the original black and white picture are preserved.

3-GRFX

`LINE [↓] Draw Line(s)`

Draws straight lines. The lines are drawn with the current brush color, shape, and blend style as if you drew them yourself (but straighter).

K-Paint prompts:

```
Move the cursor to the start of the line
Press pen or <Enter>

Move the cursor to the end of the line
Press pen or <Enter>
```

The *rubber band* line cursor shows you where the brush stroke will go.

To draw another line starting from where the first one ended, move the cursor to a new endpoint and press the pen or **Enter**. To break the connection to the line you just drew and start a new set of lines, lift the pen away from the pad (the cursor disappears) or press **Del.**

`RECT [↓] Draw Rectangle`

K-Paint displays a rectangular blinking box on the screen.

K-Paints prompts:

```
Position rectangle:   with pen or arrow keys
Draw with current brush:   Tap pen or <Enter>
```

A blinking arrow points at the upper right corner of the box. That arrow points to a ***pin position***. To change the pin position, press any number from 1 through 9. There are nine possible pin positions; they are located about the cursor box like the nine spaces in a tic-tac-toe grid, corresponding to the location of the numbers in the numeric keypad on the right side of the keyboard. For instance, pin position "2" is the center of the bottom side of the box, "5" is the center of the box, and "9" is the top right corner.

To change the box size, hold down **Shift-Char** and press any cursor arrow. The pin moves in the direction of the cursor. When pin "2" is selected, **Shift-Char** [←] brings both sides of the box in and **Shift-Char** [→] moves both sides out. Experiment with different pins and different shift directions. You'll find that the box size changes in a predictable way.

To draw concentric rectangles, ellipses or ramps conveniently, *constrain* the rectangle so it always maintains the same aspect ratio of height to width. Press **Center** to constrain these objects. When constrained, only the width of the box can be changed; the height is computed by K-Paint. To turn off constraints, press **Center** again.

To check that constrained objects are centered, use the keyboard, select pin "5," and move the sides of the box in and out with **Shift-Char** [←] [→].

From the Pad

With the cursor inside the box, a white square appears at the center of the box. Press the pen to move the box around the screen without changing its shape.

With the cursor at the side of the box, an arrow appears. Press the pen down to move the side in or out.

With the cursor at the corners of the box, an arrow points at the corner. Press the pen down to move the corner (and both sides attached to it) to change the box size.

From the Keyboard

The cursor keys move the entire box up, down, left, right. To choose the Pin location, press a number from **1-9**.

When unconstrained

Shift-Char [→][←][↑][↓] moves the "pinned" sides in the expected direction.

K-Paints prompts:

```
Tap pen or <Enter>
```

When the box is in position, tap with the pen or **Enter**. The rectangle is drawn with the current brush color, shape and style.

ELLIPSE [↓] `Draw Ellipse`

K-Paint displays a *rubber band* ellipse on the screen. Move the ellipse around the same way you move the `Grfx Rect` rectangle box. The ellipse is inscribed within an imaginary rectangle. The arrows work the same way they do for the rectangles. K-Paint draws the ellipse with the current brush color, shape and style when you tap the pen or press **Enter.**

4-RAMPS

`RAMP [↓]` `Draw RGB Color Ramp`. The usual rectangular box appears on the screen. Move the box until it covers the appropriate area.

K-Paint prompts:

```
Position rectangle:   with pen or arrows
Select a side:        pen or type a #
Make the ramp:        Tap pen or <Enter>
```

K-Paint draws a color ramp inside the box. The pinned side will get the color of paint pot 7; the opposite side will get the color of paint pot 8. K-Paint chooses colors to provide a smooth transition in RGB color space from one side of the box to the other. K-Paint does its best to limit the number of colors. However, this function uses colors up pretty quickly.

Quit aborts all ramp functions.

You can control the number of colors used in the ramp. After you press **Enter** to start the ramp, K-Paint prompts for the *maximum* number of colors to use.

K-Paint prompts:

```
Enter maximum # of colors for ramp->
```

K-Paint draws the ramp and advises you of the number of colors it used. If possible, K-Paint uses fewer colors than the maximum.

`Ramps` not only ramp the RGB colors of pots 7 and 8, but also the key values. To ramp the key signal, put different key values in each pot.

The following two functions work the same as `Ramp`.

`LEFT HUE [↓] Draw HSV Color Ramp moving left`

Takes the ramp left along the hue bar—from yellow to blue through red.

`RIGHT HUE [↓] Draw HSV Color Ramp moving right`

Takes the ramp right along the hue bar—from yellow to blue through green.

5-EFFECTS

`MOVE WRAP [↓]Move ppic (wraparound)`

Moves the whole picture. Place the cursor anywhere on the picture. As you press down and move the pen or press **Shift-Char** [→][←][↑][↓], the whole ppic moves on the screen. Pixels that move off the edge of the screen re-appear at the opposite edge.

Tap the pen or **Enter** to *freeze* the picture in its new position. When you select another function without first freezing the picture, the picture is repositioned back to where it was before you moved it.

`MOVE REG [↓]Move ppic`

Also moves the whole picture. Pixels that move off an edge disappear (to move them back on, shift the picture the other way). Screen color fills vacated edges of the screen.

Tap the pen or **Enter** to *freeze* the picture in its new position.

`LINK [↓]Link colors`

Anti-aliased border fills and color changes are convenient, but they are achieved at the expense of using extra colors. Red painted from a wash brush is "different" from red painted from a normal brush. If the status monitor indicates too many colors are in use, you can reduce the number with the `Link` function.

Tap the pen or press **Enter**, and K-Paint determines which colors can be linked. Tap the pen or press **Enter** again, to combine (or link) those colors. This may reduce the number of colors required so you can continue.

`QUANT [ ↓]Quantize ppic`

Reduces the number of colors in picture. This powerful function changes the numbers of colors in a picture. K-Paint chooses new colors that most closely approximate the original picture. If enough colors are used in the final picture, you can achieve good results with very little picture degradation.

This effect gracefully makes room for more colors to be painted into a picture. `Quant` can also be used to reduce the number of colors in a ppic, so you can type over it with anti-aliased many-colored fonts.

Move the cursor down off the sub-menu line and press **Enter**. K-Paint counts the number of active colors and asks how many colors you wish to use. Enter that number, and K-Paint reduces the number of colors (quantize).

You can change your mind after seeing the result. To restore the original picture, tell K-Paint to quantize using the original number of colors.

6-CHANGE

While in Change mode (Global,Area,Single), only Hue, Saturation, Value, Opacity bars, and the paint pots are available. All other palette functions are disabled.

`GLOBAL [ ↓] Global Color Change`

Changes the color of a brush that was used for painting or filling. All strokes of that color change, including anti-aliased blends.

K-Paint prompts:

```
Choose color:    Press pen or <Sel Disp>
```

Move the cross-hair cursor to a pixel and press the pen or **Sel-Disp** to select the color. If the color is part of the ppic and not part of a brush-stroke, only that color changes. If the color (pixel) is part of a brush stroke or fill, the picture changes as if you had painted with a different color brush.

After you select a color to change, the palette appears over the picture. You can only change the Hue, Saturation, Value and Opacity bars. K-Paint ignores any attempts to change brush styles, etc. The paint pots are still active. As you change the color on the palette, the color in the picture changes to match what you've done. Lift your pen away from the pad or **Enter**.

You can go back and change another brush color.

With the global color change function, you can make the color of the brush the same as the ppic (screen) color. Thus you can sketch a picture with one brush color, paint over it with another, and then erase the original brush strokes.

`AREA [ ↓ ] Area Color Change`

Changes a color within an area. Use `area` to change color in just one part of the screen.

After you select `area`, the rectangular box appears. Move it around as usual and then tap the pen or **Sel-Disp**. The box freezes on-screen.

Move the cross-hair cursor to a pixel inside or outside the box. To select the color, press the pen or **Sel-Disp**. The palette appears. Adjust the color.

With the cursor inside the box, all pixels with the same color inside the box change.

With the cursor outside the box, all pixels with the same color outside the box change.

Lift the pen or press **Enter** when the new color is correct.

`PIXEL [ ↓ ] Single Pixel Color Change`

Changes the color of individual pixels. Move the cursor to a pixel. Press the pen or **Sel-Disp**. Change the color of the pixel in the palette. Magnify mode helps here. Lift the pen or press **Enter** when the new color is correct. This function is very useful for font fixing.

Alt I	clears the entire screen to the brush color.
Erase-Text	clears the entire screen to the brush color.

3. THE FONT FIXER

You can stamp a *ppic on an entire font.* You can paint on non-edged, anti-aliased characters such as are created with the K-series Video Digitizer. K-Paint Font Fixer has two modes.

Stamping	creates an entire new font of Preset Color characters.
Painting	alters individual characters. You can then record them in the same font or in a different font. Painting is especially useful for touching up the anti-aliasing which the digitizer camera produces.

3.1 Stamping Entire Fonts

Read a ppic in the character generator or create one in K-Paint to become the foreground of your font.

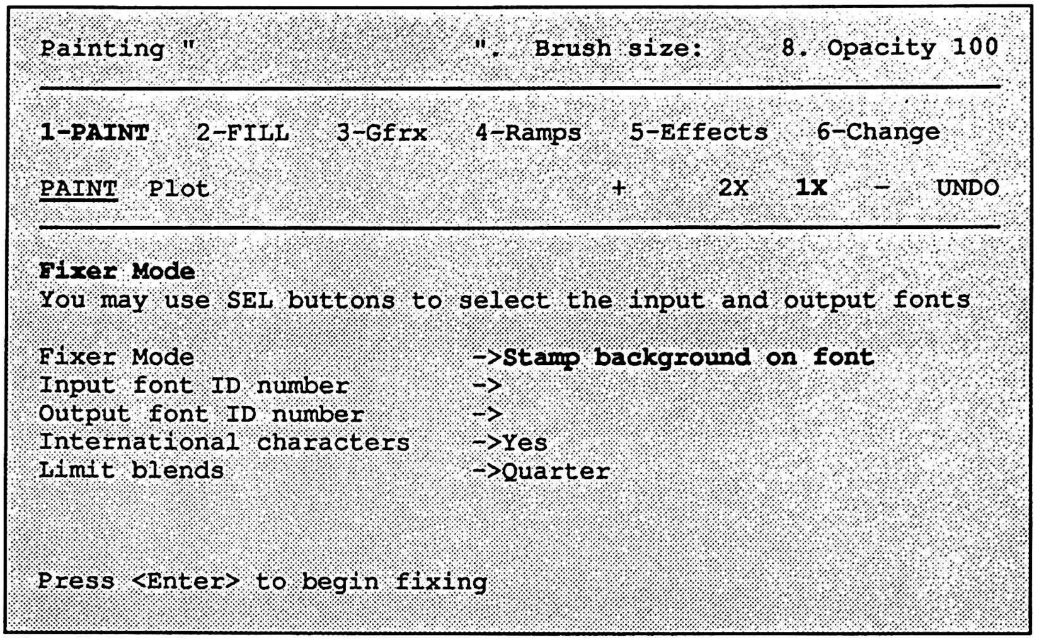
Assign the input font to a selector in the character generator. The edge and shadow of the output font will be the same as the selector's edge and shadow. If the font is not assigned to a selector, the edge and shadow will be black.

Stamping results in a Preset-color font.

You cannot stamp Preset-color fonts — `PST` in the Font Directory.

In K-Paint, press

Font	enters/exits Fixer mode. This key is a toggle.



```
Painting "                    ". Brush size:     8. Opacity 100
-----------------------------------------------------------------
1-PAINT   2-FILL   3-Gfrx   4-Ramps   5-Effects   6-Change

PAINT  Plot                             +      2X    1X   -   UNDO
-----------------------------------------------------------------
Fixer Mode
You may use SEL buttons to select the input and output fonts

Fixer Mode                    ->Stamp background on font
Input font ID number          ->
Output font ID number         ->
International characters      ->Yes
Limit blends                  ->Quarter


Press <Enter> to begin fixing
```

Menu 7: Font Fixer mode - Stamping

Next or **Prev**	Choose stamping mode
[↓]	Enter the input and output fonts. You can enter a font number by 1. Pressing a selector button. This is the preferred way so you can pre-determine the edge and shadow. 2. Using **Next** or **Prev** to scroll through the available fonts on the selected disk. 3. Typing the number.

If the output font number doesn't specify an already existing font, the Fixer automatically creates a new Preset-color font with that new ID number.

You can change your mind. To choose another output font number, first press **Enter** then press **Font Font** (twice). To place another ID number in the Output font parameter, type another ID number, use another selector button, or use **Next/Prev.** **Next** and **Prev** scroll through the available fonts on the selected disk.

If the output font already exists, you can over-write it. Type any character in the input font. *BEWARE..the old font will be completely destroyed!*

Specify whether to stamp any international characters in the font.

Choose the number of blend colors. The default here is `Quarter`, which uses the least amount of colors. This choice is preferable since `Half` and `Full` may result in K-Paint running out of colors. Use the smallest amount of blends possible which produce the results you want. Don't use more than necessary.

Enter	loads the input font and assigns it to Selector 1, unless you've assigned the input font to another selector in the character generator.

To start stamping, type any character. K-Paint draws that character in a blinking box. If the input font has an edge and/or drop shadow, the foreground of the character will be transparent so you can see exactly what ppic is being stamped. Use the cursor arrows to move the character to the area of the ppic you want stamped on the font.

After you've selected all the parameters, press **Enter** to stamp the entire font.

During stamping, the status monitor prompts

```
Press COMPOSE at any time to quit and return to Paint System
```

Should you press **Compose**, or should K-Paint run out of colors, the status monitor prompts

```
        Fixing cancelled...save partial results (Y/N)
```

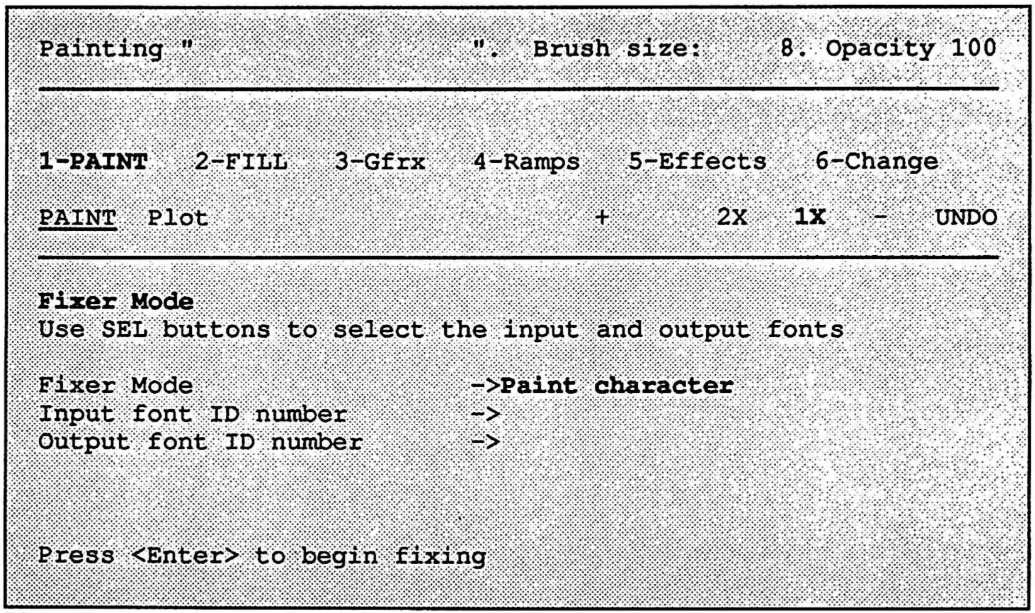
When stamping is complete, the output font is recorded on your selected disk, and assigned to Selector 2, unless the input font is already assigned there. In that case, the output font is assigned to Selector 3. When you exit K-Paint, the output font is selected and ready to type.

3.2 Painting Individual Characters

You can paint only non-edged, anti-aliased characters.

In K-Paint, press

Font	enters/exits Fixer mode. This key is a toggle.



```
Painting "                    ".  Brush size:     8. Opacity 100

1-PAINT   2-FILL   3-Gfrx   4-Ramps   5-Effects   6-Change

PAINT  Plot                        +        2X    1X    -    UNDO

Fixer Mode
Use SEL buttons to select the input and output fonts

Fixer Mode                  ->Paint character
Input font ID number        ->
Output font ID number       ->


Press <Enter> to begin fixing
```

Menu 8: Font Fixer mode - Paint Character

Next or **Prev**	Choose Paint character mode.
[↓]	Enter the input and output fonts. You can enter a font number by 1. Pressing a selector button. This is the preferred way so you can pre-determine the edge and shadow. 2. Using **Next** or **Prev** to scroll through the available fonts on the selected disk. 3. Typing the font number.

To fix a character and put it back in the same font, enter the same font number for both input and output fonts. If the output font already exists, you can over-write it. Type the character you want to paint. *BEWARE..the old font will be altered!*

If the output font number doesn't specify an already existing font, the Fixer automatically creates a new anti-aliased font with that new ID number.

You can change your mind. To choose another output font number, press **Enter** then press **Font Font** (twice). To place another font number in the Output font parameter, use another selector button, use **Next Prev** or type another font number. **Next** and **Prev** scroll through the available fonts on the selected disk.

To start `Paint a character,` type the character you want to paint. The screen will be erased (any picture will be permanently erased) when you press any key except **N**. **N** exits the fixer.

The character is drawn in a blinking box and you can use the full resources of the paint system to alter it. Magnify the character with **Next**; demagnify with **Prev**. The default brush will be a 1-pixel square key brush, and initially, you'll be on the opacity bar of the palette.

Since only anti-aliased characters can be painted, only changes in luminance (value) will be noticed when the character is put back into the font, regardless of any colors used.

An easy way to fix individual pixels is to use Change Single Pixel mode. Watch the pixel lighten and darken as you move the opacity scale up and down. Press **Enter** to make the changes permanent.

Press **Record** to record the character to the output font. The output font will be assigned in the same manner as in stamping mode. Press **Font** to paint another character.

4. READ AND RECORD

Record	saves a picture or the paint pots. The recording process is similar to the 20-K record functions and the menus show you what to do.
Read	reads ppics or saved paint pots. Enter the name of the ppic/pots you want, press **Enter** or **Read**. K-Paint reads in something to paint on (or your pots).

5. INSTALLING THE PAD

Before unpacking, inspect the shipping carton for external damage. If any damage has occurred in transit, contact your Grass Valley sales representative and/or Dubner Computer System's shipping department immediately. Unpacking any package which is obviously damaged may result in a much more complicated situation than just trying to get a damaged machine to operate.

If there is no apparent damage, open the package to make sure you have all of the following:

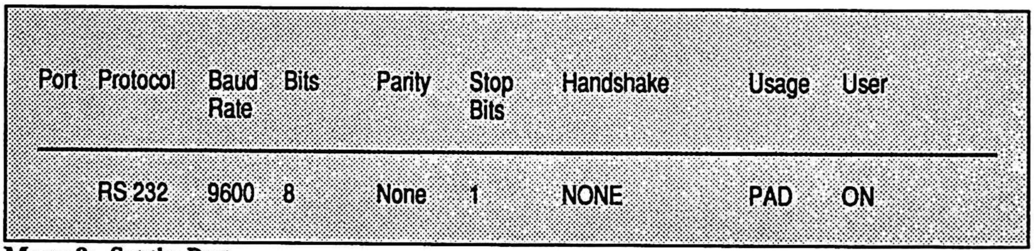
1 WACOM pad
1 Pen
1 AC cord
1 Interface Cable

The pad plugs into any free RS-232 serial port B through D. (Port A is reserved for the keyboard.) The ports are at the back of the 20-K.

The pad has three sets of DIP switches. Figure 8, "Wacom Bitpad Settings," describes the settings for the Wacom pad. We ship the pad with the switches in the correct position.

The interface cable has a chrome side and a black side. The ***chrome side*** is the WACOM connector. The ***black side*** is the 20-K connector.

To configure your software, press **Confg P** to set the port definitions. Set the port you plan to use to:

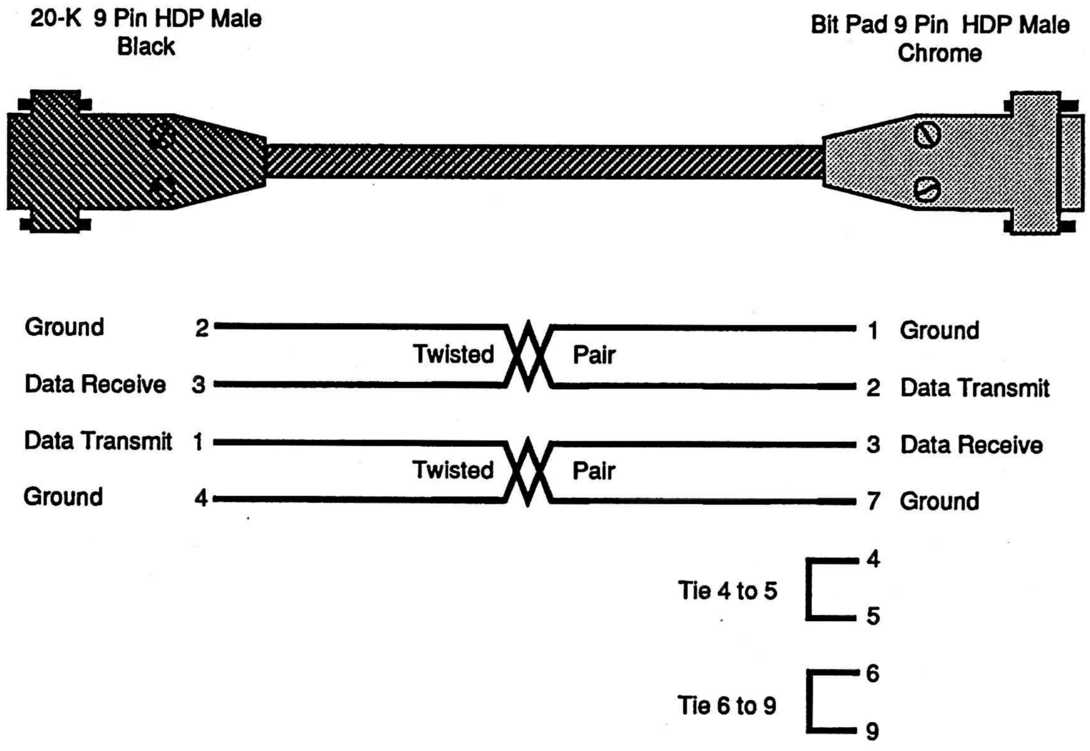


```
Port Protocol Baud  Bits     Parity  Stop   Handshake     Usage  User
              Rate                   Bits
-----------------------------------------------------------------------
     RS 232   9600  8        None    1      NONE          PAD    ON
```

Menu 9: Set the Port

Don't forget to log out the port setting. (**Confg Y S**). Reboot after reconfiguring.

20-K to Wacom Bit Pad RS 232 Cable


20-K 9 Pin HDP Male
Black
Bit Pad 9 Pin HDP Male
Chrome
Ground 2
Data Receive 3
Twisted
Pair
1 Ground
2 Data Transmit
Data Transmit 1
Ground 4
Twisted
Pair
3 Data Receive
7 Ground
Tie 4 to 5
4
5
Tie 6 to 9
6
9

Wacom Switch Settings

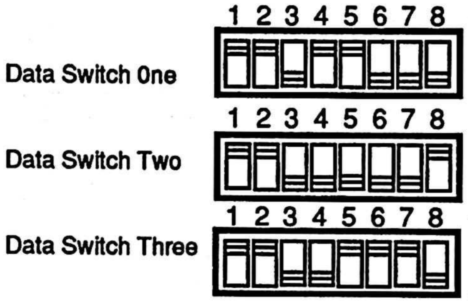
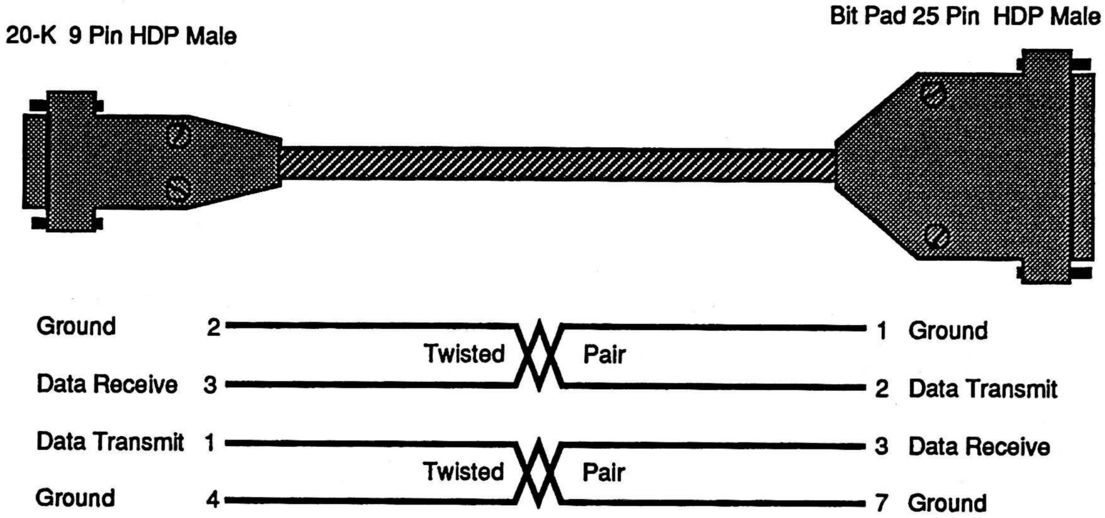

1 2 3 4 5 6 7 8
Data Switch One
1 2 3 4 5 6 7 8
Data Switch Two
1 2 3 4 5 6 7 8
Data Switch Three

Figure 8. Wacom Bitpad Settings

20-K to GTCO Bit Pad RS 232 Cable


20-K 9 Pin HDP Male
Bit Pad 25 Pin HDP Male
Ground 2
Data Receive 3
Twisted Pair
1 Ground
2 Data Transmit
Data Transmit 1
Ground 4
Twisted Pair
3 Data Receive
7 Ground

GTCO Switch Settings

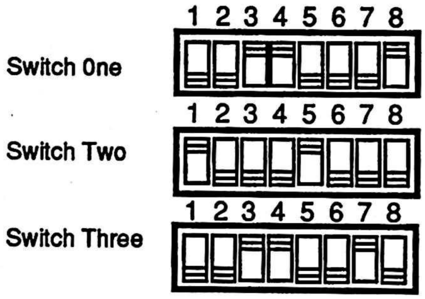

Switch One
1 2 3 4 5 6 7 8
Switch Two
1 2 3 4 5 6 7 8
Switch Three
1 2 3 4 5 6 7 8

Figure 9. GTCO Bitpad Settings

The RGB Scanner

May10, 1990

Software Version 2.0

Dubner Computer Systems

6 Forest Avenue
Paramus, NJ 07652

A Grass Valley Group Company

1. INTRODUCTION

The ***Howtek RGB Scanner*** (other scanner may work, but we've tested the Howtek) enables the 20-K to scan and store color pictures. Subsequently, you can recall these pictures for display either as ppics (backgrounds) or as characters in fonts (see Character Capture in Chapter 8 of the User's Guide). A sophisticated ***color quantization*** program reduces the number of colors needed to display the scanned images so that only 250 or less colors are required. You can scan pictures as large as 8 1/2 by 11 inches or you can crop pictures to scan only a two inch square area. Conversely, you can scan pictures to fill the screen or reduce them for "over-the-shoulder" compositions using only a small area of the screen. You can also create interesting "stretch" and "squeeze" transformations while scanning.

See Figure 10. "20-K to Howtek Scanner." for information on how to connect your scanner. The scanner itself should be placed on a table or other horizontal surface near the 20-K.

1.1 Advisory

Units whose serial number is less than 2032 require a modification to the CPU card. See Section 4, "Installation and CPU Modification Procedure."

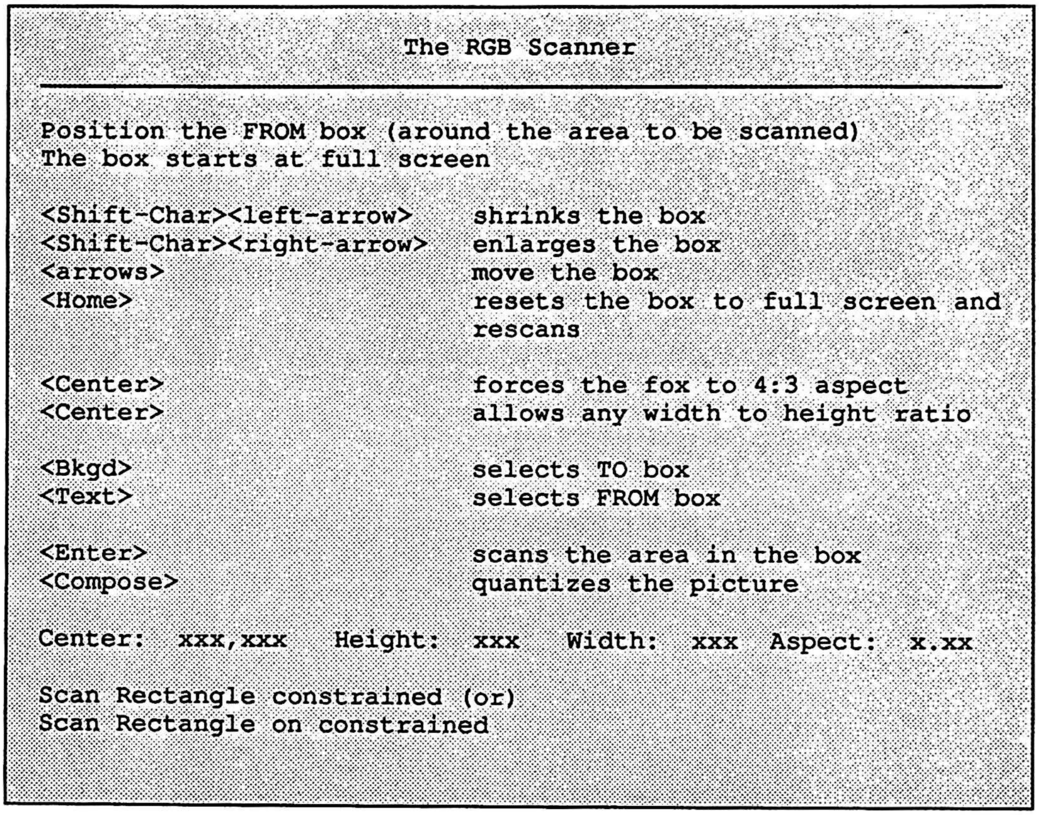
2. SCANNING

To start the scan, use the Do command:

```
Do scan Enter
```

The scanner scans its entire scanner bed, or platen, with a display that fills the video screen. The 20-K uses 256 (unquantized) colors to show both the preliminary platen scan and subsequent composition scans. The colors are uniformly distributed throughout RGB color space, so the quality of the first scan is significantly lower before quantization. See “Quantize” in Chapter 8 of the User’s Guide.

When the preliminary platen scan is complete, a blinking square appears in the center of the color display screen and the status monitor displays the following summary of important keystrokes.



```
                        The RGB Scanner
─────────────────────────────────────────────────────────────

Position the FROM box (around the area to be scanned)
The box starts at full screen

<Shift-Char><left-arrow>    shrinks the box
<Shift-Char><right-arrow>   enlarges the box
<arrows>                    move the box
<Home>                      resets the box to full screen and
                            rescans

<Center>                    forces the fox to 4:3 aspect
<Center>                    allows any width to height ratio

<Bkgd>                      selects TO box
<Text>                      selects FROM box

<Enter>                     scans the area in the box
<Compose>                   quantizes the picture

Center:  xxx,xxx  Height:  xxx  Width:  xxx  Aspect:  x.xx

Scan Rectangle constrained (or)
Scan Rectangle on constrained
```

These keystrokes affect both the FROM and TO boxes.

2.1 The FROM Box

A blinking square is at the center of the area to be scanned. That area is within the FROM box. Only those portions of the picture within the FROM box are scanned—those portions outside the box are cropped off and are not scanned.

Enter	***scans the area in the FROM box.*** When you first enter scan mode, the FROM box includes the entire platen.

To scan only a portion of a picture, shrink the FROM box by holding **Shift-Char** and [←] down together. The blinking box becomes smaller, maintaining the 4:3 height to width aspect ratio of the display screen. **Shift-Char** [→] makes the box bigger.

2.2 The TO Box

The area of the display screen into which you scan the picture is the TO box. When you enter scan mode for the first time, the TO box covers the entire screen. To fill the entire display screen with the scanned picture, do not change the size of the TO box.

Bkgd	***selects the TO box.*** *NOTE:* The TO box does not blink. The part of the image you surround with the FROM box is scanned into the part of the display screen you surround with the TO box. Portions of the display screen outside the TO box are filled with transparent color.
Text	***selects the FROM box.***

2.3 Aspect Ratio

The FROM and TO boxes are constrained to keep a 4:3 aspect ratio when they change size. This prevents distortion of the scanned picture. Sometimes you want such distortion. To remove the constraint on size change, press

Center The status monitor displays

```
Scan Rectangle is not constrained.
```

When the Scan Rectangle is not constrained the following keystrokes apply:

Shift-Char [←]	makes the box narrower.
Shift-Char [→]	makes the box wider; the height remains unchanged.
Shift-Char [↑]	makes the higher.
Shift-Char [↓]	makes the box shorter.
Center	restores the box constraints to accommodate the 4:3 aspect ratio of the display screen based on the width of the image.

After the picture is scanned, you can quantize it.

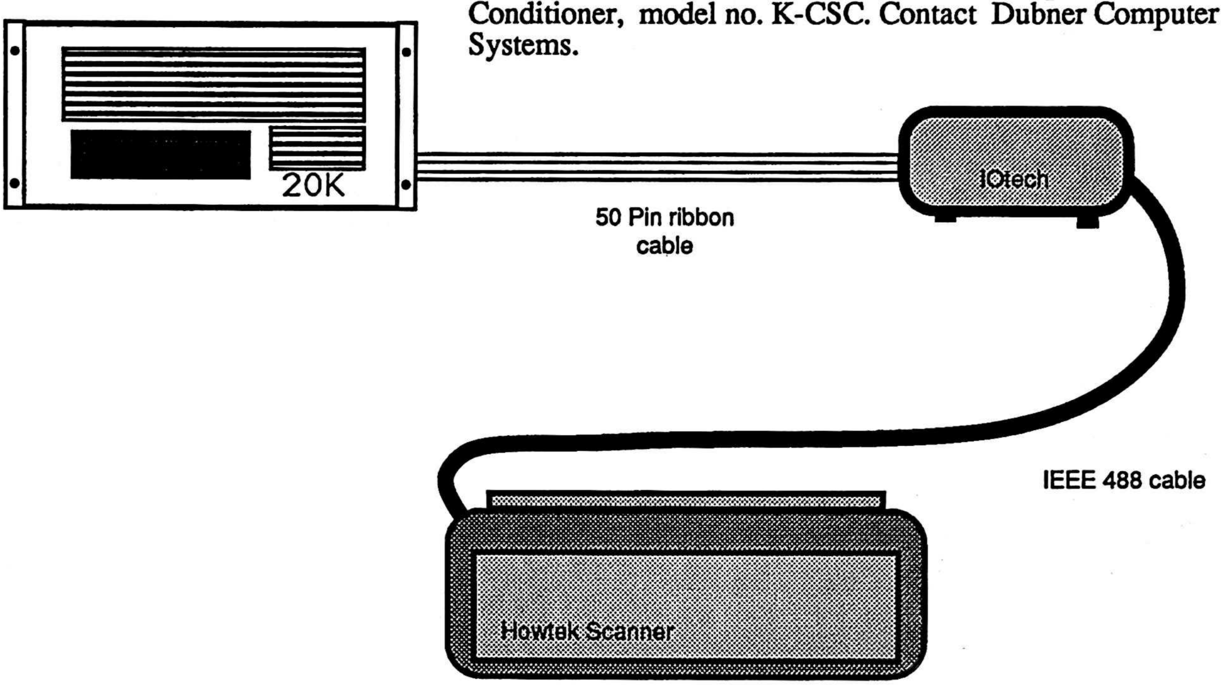
3. QUANTIZING

Compose	*starts quantization.* See Chapter 8 of the User's Guide. The status monitor prompts for how many colors to use. You can enter as many as 250 colors or as few as one. If you make no entry, the 20-K uses 128 colors. This provides you with enough colors to type with. Some images need surprisingly few colors; others need more.
Enter	*repeats quantization.* You can try different numbers of colors.
Compose	*returns to Compose mode.* Record your final picture.

NOTE: When you re-enter scan mode, (**Do** `scan` **Enter**) the `TO` and `FROM` boxes retain their previous size and position.

20-K to Howtek Scanner

20-K units with a Serial no. less than 2032 require a SCSI Conditioner, model no. K-CSC. Contact Dubner Computer Systems.


20K
IOtech
50 Pin ribbon cable
IEEE 488 cable
Howtek Scanner

Switch Settings

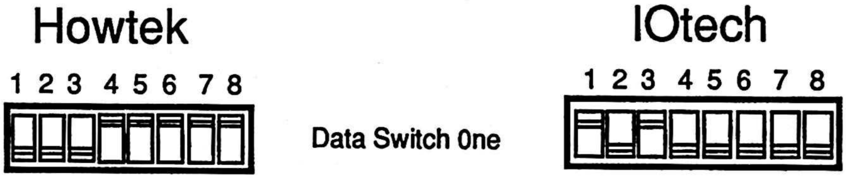

Howtek
1 2 3 4 5 6 7 8
Data Switch One
IOtech
1 2 3 4 5 6 7 8

Figure 10. 20-K to Howtek Scanner

4. INSTALLING THE SCSI CONDITIONER

Units with a Serial number less than 2032 require a SCSI Conditioner, model number K-CSC. This section describes the procedure for installing this SCSI conditioner.

4.1 Unpacking

Before unpacking, inspect the shipping carton for external damage. If any damage has occurred in transit, contact your Grass Valley sales representative and/or Dubner Computer System's shipping department immediately. Unpacking any package which is obviously damaged may result in a much more complicated situation than just trying to get a damaged machine to operate.

If there is no apparent damage open the package to make sure you have one of the following:

Dubner Computer System SCSI Conditioner Box
Power Supply
1 Foot 50 Pin Ribbon Cable
3 Foot 50 Pin Ribbon Cable
1 Foot of 30 AWG Wire
Software Package

4.2 Removing the Unit from its Case

1. Turn the unit off.

2. Disconnect all the wires on the back of the unit. *NOTE:* Remember where they go.

3. Remove the three screws on the rear panel. See Figure 11. "The Rear Panel." These three screws secure the unit in its outer case.

4. Pull the unit out until you hear two clicks.

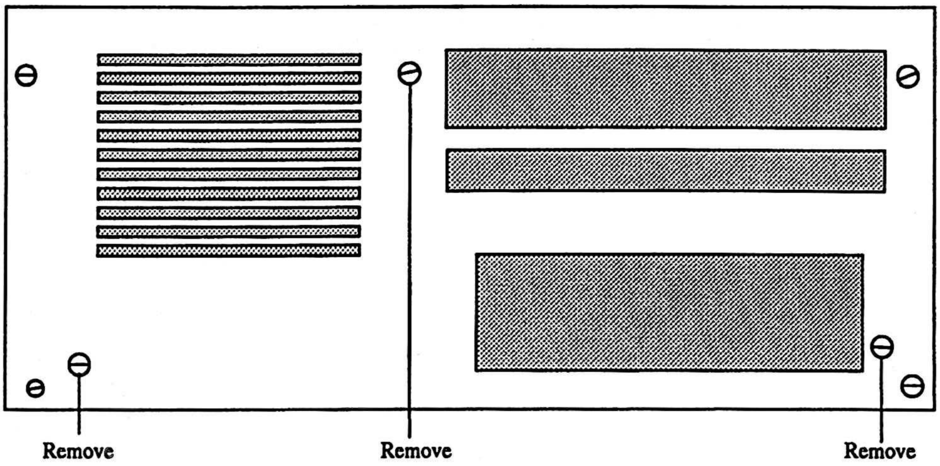


Figure 11. The Rear Panel

4.3 Modifying the CPU Card

5. ***On the right side of the unit***: Remove the uppermost four flat head screws. The upper two screws hold the upper card (the display card) and the lower two hold the lower card (the CPU card).

6. Lift the right side of the display card. It is on a hinge.

7. This modification is done on the *component* side of the lower card (CPU). Using a piece of the 30 AWG Wire, make the following jump:

   JUMP U141 Pin 6 to U155 Pin 13

4.4 Replacing the Unit in its Case

8. Replace the four flat head screws that hold the CPU and Display cards.

9. Push in the tabs on both sides of the unit while pushing in the front of the unit.

10. Replace the three flat head screws ont the rear panel and replace all the cables.

4.5 Cabling the SCSI Conditioner

11. The 1 Foot 50 Pin Ribbon Cable goes from the back of the connector labeled `SCSI` *or* the rear of an external disk drive connector labeled `SCSI OUT TO` to the SCSI Conditioner connector labeled `HOST`.

12. The 3 Foot 50 Pin Ribbon Cable goes from the SCSI Conditioner connector labeled `CONTROLLER TO` to the IOtech SCSI488 Bus Controller connector labeled SCSI.

Presentation Graphics

May 10, 1990

Software Version 2.0

Dubner Computer Systems

6 Forest Avenue
Paramus, NJ 07652

A Grass Valley Group Company

1. INTRODUCTION

The Presentation Graphics System is a subsystem of the 20-K. With it you can enter data quickly, create ppics (backgrounds), and assemble text for professional-looking charts. There are eight basic chart formats:

- bar
- stacked bar
- column (vertical bars)
- stacked column
- pie
- area fill
- straight line
- scatter

Completed charts are composed of up to twelve of the basic formats. For instance, with one set of graphs you can display data in up to ten column charts and two pie charts. You can adjust the size, color and position of all the objects on the screen that make up a finished slide. You can also control the text and the legends describing the display. A limited animation capability grows bars and columns at variable speeds.

To enter the Presentation Graphics System (hereafter we'll use the word, "Graphics"), press **Graph** in Compose mode. (The **Graph** button is near the **Quit** button. **Confg O** is a toggle that enables/disables **Graph** when on-air, to prevent users from inadvertently entering Presentation Graphics.)

You can then enter data, create or modify graphs, and save or retrieve graphs and data. When you return to Compose mode, the 20-K creates a ppic and a text foreground that can be manipulated with the usual 20-K commands. When you enter Graphics again, the data and format remain waiting further modification.

Graphics maintains data separately from the slide formats so that you can construct and save a format in advance. This is especially important in a sports or election environment when the data may not be known until seconds before the slide is shown. Since you can separate the data from the format, you can use more than one format to display the same set of data without having to re-enter the data. You can also display the same format with different data.

Data is entered as X and Y points, as text strings (e.g. Wheat 600 bu), as numeric sequences and as date sequences. In numerical and data sequences, Graphics automatically prompts for point values.

1.1 Definitions and Rules of Composition

> *"When I use a word, it means just what I choose it to mean, neither more nor less". --Humpty Dumpty*

The terminology for presentation graphics is non-standard. In this section, we'll define the terms used in the system menus and in this manual. For words that appear on the status monitor, we use a typewriter font: `chart`; when we define a new term, we use ***bold italics***; for emphasis we *italicize* words; when we're describing a keystroke, we use a big fat font: **Enter**.

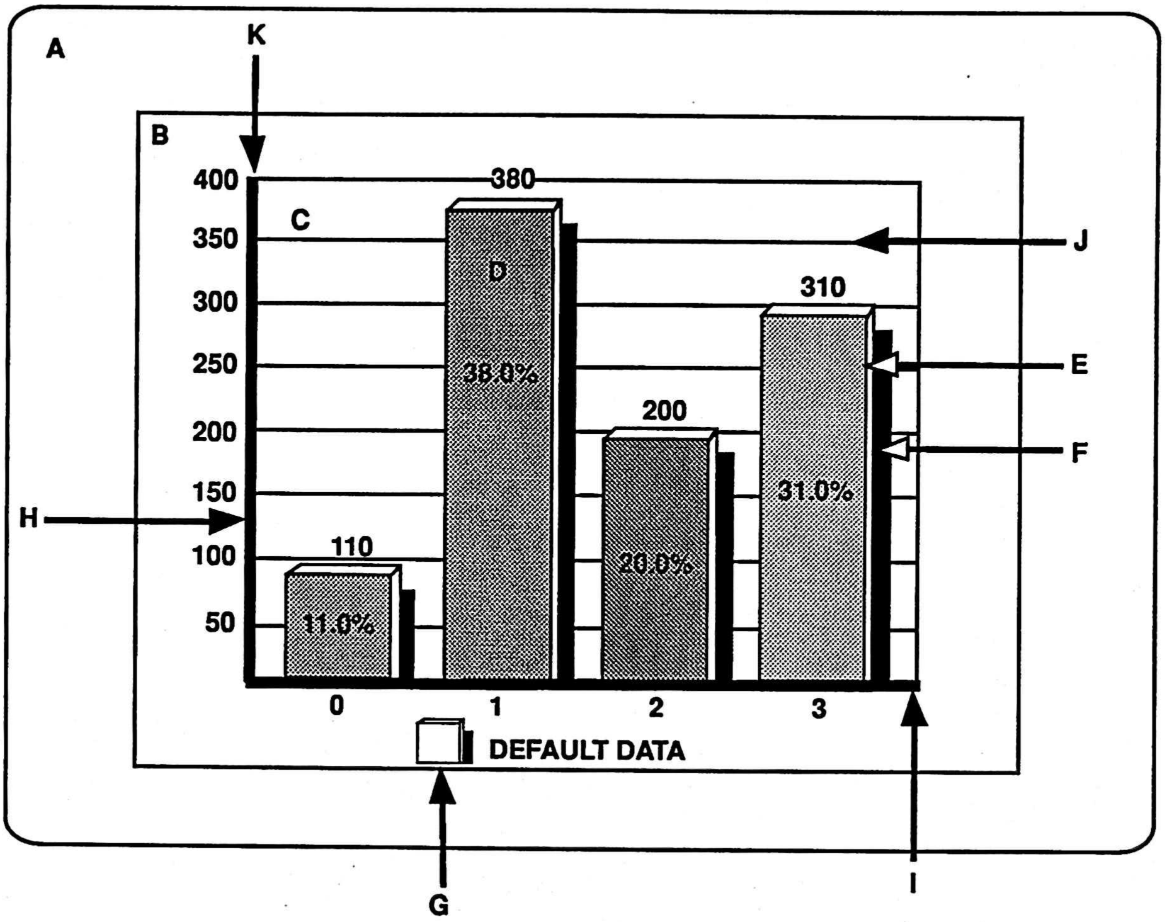
Color. Each object drawn on the screen (including the screen background) has its own ***color***. Several objects can have the same color. Colors are specified via a palette change screen similar to that shown when **Pal** is pressed within the 20-K system. Each color has a red, green and blue value. Colors can be expressed in terms of hue, saturation and value. See the 20-K User's Guide.

Each color also has a ***key***. The key value is a measure of the ***opacity*** of the color. When the 20-K video signal is switched with another (possibly live) signal, colors with a key value of 0 (opacity = 0%) are transparent, those with a key value of 1 (opacity = 100%) are opaque, and those with a key value or opacity in between are translucent with the specified percentage of the color output of the 20-K being mixed with the background signal. This ***linear key*** capability of the 20-K makes it a powerful video tool.

Screen. The ***screen*** covers the entire display; its size is determined by the display encoding scheme. The NTSC screen is 485 (visible) lines by 1340 dots per line, the PAL screen is 575 X 1340, etc. The screen is 4/3 as wide as it is high. Screen dimensions determine the ***aspect ratio*** of objects on the screen -- if screen dimensions change, a circle is drawn differently, or it becomes elliptical. The *upper* left corner of the screen is the point x (dot) = 0, y (line) = 0 expressed in *absolute* coordinates. You can not change the size and placement of the screen.

You can change screen color using the 20-K palette change function; its key value is usually 0 (transparent).

No object drawn on the screen goes beyond its borders. Graphics clips objects so they stay on-screen. Refer to Screen Elements A, Figure 12.


A
K
B
C
D
400
350
300
250
200
150
100
50
380
310
200
110
38.0%
31.0%
20.0%
11.0%
0
1
2
3
DEFAULT DATA
J
E
F
H
G
I

SCREEN ELEMENTS

A – Screen
B – Slide
C – Graph
D – Foreground
E – Edge
F – Drop Shadow
G – Legend
H – Y Axis
I – X Axis
J – Grid Lines (Y Big)
K – Tick Marks (Y Big)

TEXT ORIGIN

Chart Foreground	(110, 380, 200, 310)
Chart Edge	(0, 1, 2, 3)
Chart Drop Shadow	(11.0%, 38.0%, 20.0%, 31.0%)
Legend/List Title	(Default Data)
Y Axis	(50, 100, ..., 400)

Figure 12. Screen Elements

Slide. The ***slide*** is a rectangle of a specified color drawn within the borders of the screen. Its height, width and position are changeable and are defined in ***relative coordinates***—percentages relative to dimensions of another object—in this case the screen.

Every object is defined relative to some other object in a fixed hierarchy. When the dimensions of an object change, all objects that depend on it change accordingly when the slide is redrawn. Thus, if the slide width is originally 80% of the screen width, and it is changed to 40%, all objects that depend on the slide (in this case, every object on the screen) will be half as wide when the screen redraws. Relative coordinates are shown as percentages.

In relative coordinates, the point x = 0%, y = 0% is the *lower* left corner. Relative coordinates behave like the Cartesian coordinates we learned about in school; absolute coordinates behave like the broadcast hardware. See "Screen Elements H," Figure 12.

Graph. A ***graph*** is a rectangle of a specified color that depends on the slide. Up to twelve graphs are displayed on a slide; there is only one slide on the screen. You can draw graphs in separate areas of the slide. For instance, the graph selection menu displayed on the color monitor at system startup shows eight graphs in different areas of a slide all plotting the same data.

Each graph contains many ***graph elements—grid lines, axes, tick marks***, and ***charts*** that actually display the data. You can draw (or not draw) each of these elements and display (or not display) the text associated with them. Each element depends on the graph, which in turn depends on the slide. All the graph elements are selected (and then manipulated) in each graph (with the exception of pie charts. See Section 3.4).

The size and position of the graph elements described below are set to certain default values when you select a ***chart style*** (bar, line,scatter, etc). You can change these initial values to almost any other value—the little X tick marks can be made bigger than the big X tick marks. The graph elements used by other chart styles have no meaning for pie charts and Graphics deletes them when a pie chart is selected.

> **Axes.** The ***X-axis*** is a rectangle drawn across the bottom of the graph. The ***Y-axis*** is a rectangle draw along the left-hand border of the graph. These positions are the default position; you can change the axes size and position dramatically. The position of the axes affects the behavior of the chart and we describe it below. Refer to Screen Elements H, Figure 12.
>
> **Tick Marks.** The ***big X tick marks*** and the ***little X tick marks*** run with uniform spacing along the X axis from 0 to full scale. The big X tick marks are slightly larger and are spaced farther apart than the little ones. The effect is similar to the marks on a ruler. That is: l...l...l...l...l...l

For ***bar, area fill, line*** and ***scatter*** charts, text for tick marks is ***derived*** from the horizontal scaling. If big X tick mark spacing is 10 and the horizontal scale goes from 0 to 50, the text for the tick marks is 10, 20, 30, 40. The X tick marks have no text for column charts and don't exist for pie charts.

Grid Lines. The ***big X grid lines*** and the ***little X grid lines*** also run with uniform spacing along the X axis. They extend all the way as far up the graph as the Y axis. With the Y grid lines, they form the familiar cross-hatched grid seen on graph paper. Text for grid lines is drawn from the same source as text for tick marks. You could change the size of the grid lines and tick marks to make them all the same size or even make the tick marks taller than the grid lines. Their names refer to their initial settings when a chart style is selected.

The ***big Y tick marks, little Y tick marks, big Y grid lines***, and ***little Y grid lines*** behave like their counterparts along the X axis. The Y marks and lines are spaced uniformly along the Y axis. Their text is drawn from the vertical chart scaling, if appropriate. There is no Y tick mark or grid line text for bar or pie charts. See Screen Elements J and K, Figure 12.

Chart. ***Chart styles*** actually display the data against the rest of the slide, graph and graph elements. As noted above, there are eight basic styles. Charts have ***foregrounds, edges*** and ***drop shadows***. For example, the foreground of a column chart is the front face of the column, the edge is the top and side faces, and the drop shadow is the (usually) black shadow. All parts of the chart style are positioned relative to one another. Charts are ***single valued*** or ***double valued*** depending on whether they need one or two values to display each point.

Single Value Charts

Columns (Vertical Bars). Each ***data point*** is represented by a column whose height corresponds to the magnitude of the data point relative to the ***Y-axis scaling*** information. The column is a rectangular prism for "3-d" styles, a rectangle for "2-d."

Bar. Each data point is represented by a horizontal bar whose length corresponds to the magnitude of the point.

Pie. Each data point is represented by a *slice* in a circle (pie). The angular separation (size) of the slice is proportional to the fraction that point makes of the entire data set. If all the points add up to 1000 and the point being displayed has a value of 200, the slice corresponding to that point will take up 20% (or 72 degrees out of 360).

Stacked Column. A column is drawn whose height is dependent on the sum of all the data points (expressed in the Y axis scaling). Each data point is represented by a colored band whose height is dependent on an individual point value. Each data point band can be a different color.

Stacked Bar. A bar is drawn whose length is proportional to the sum of all the data points. Colored bands of length proportional to each data point make up the bar.

Double Value Charts

These charts *cannot* display single value lists.

Fill. Each data point is plotted according to its x and y values. A border connects all the points and a solid color is filled to the x axis from that border.

Line. Each data point is plotted according to its x and y values. A straight line is drawn from one point to the next.

Scatter. A character is placed where each data point is plotted. These unconnected objects make up the display.

Lists. Data for the displays comes from ***lists of points***. Each list has a ***list title***—text to describe the data as a whole. Each list also contains information describing how to enter the data for that list. Each graph displays the data from one list of points. The number of bars (or columns or pie slices) is determined by the number of points in the list.

The ***data type*** specified for the entire list determines the type of data for each point. Each point always has a ***numeric value***. It also has another value, which we call ***text***.

Here we use "text" in a very specialized sense. It does not necessarily mean a collection of characters. It can be used as the second value for double value charts. The definitions below should make the meaning of "text" clear for each data type.

Numeric. Each point has a numeric text and numeric value.

TEXT	VALUE
1	100
2	400
4	200
5	300

Double value charts use the numeric text to scale the point vertically.

Single value charts do not use the numeric text for scaling; they display the text (could be wheat,etc.) so the bar, e.g., can be identified in the final display. To display the point text, set `CHART EDGE display Text` to `Yes.`

Text: Each point has a ***text string*** and a ***numeric value.***

TEXT STRING	VALUE
Wheat	100
Corn	400
Beans	200
Peas	300

Single value charts display the text string for point identification.

Double valued charts' text lists cannot be plotted since no vertical scaling information is present.

Date Sequence: Each point has a date and numeric value. In a ***sequence,*** consecutive points differ by a fixed *interval.* Intervals can be one year, one month, etc for date sequences.

DATE	VALUE
Jul 1	100
Aug 1	400
Sep 1	200
Oct 1	300

Dates in a date sequence are automatically prompted. ***Re-sequence*** points to change the starting date or interval.

Numeric sequences: Each point has a numeric text and numeric value. Each point differs from its neighbors by a fixed interval.

TEXT	VALUE
1	100
2	400
3	200
4	300

Graphics automatically prompts for numeric sequences.

2. DESCRIBING THE MENUS

To activate Graphics, press **Graph** when the 20-K is in Compose Mode. The **Graph** key is at the lower right corner of the left-hand function keys on the standard keyboard and at the upper right corner of the left-hand function keys on the deluxe keyboard.

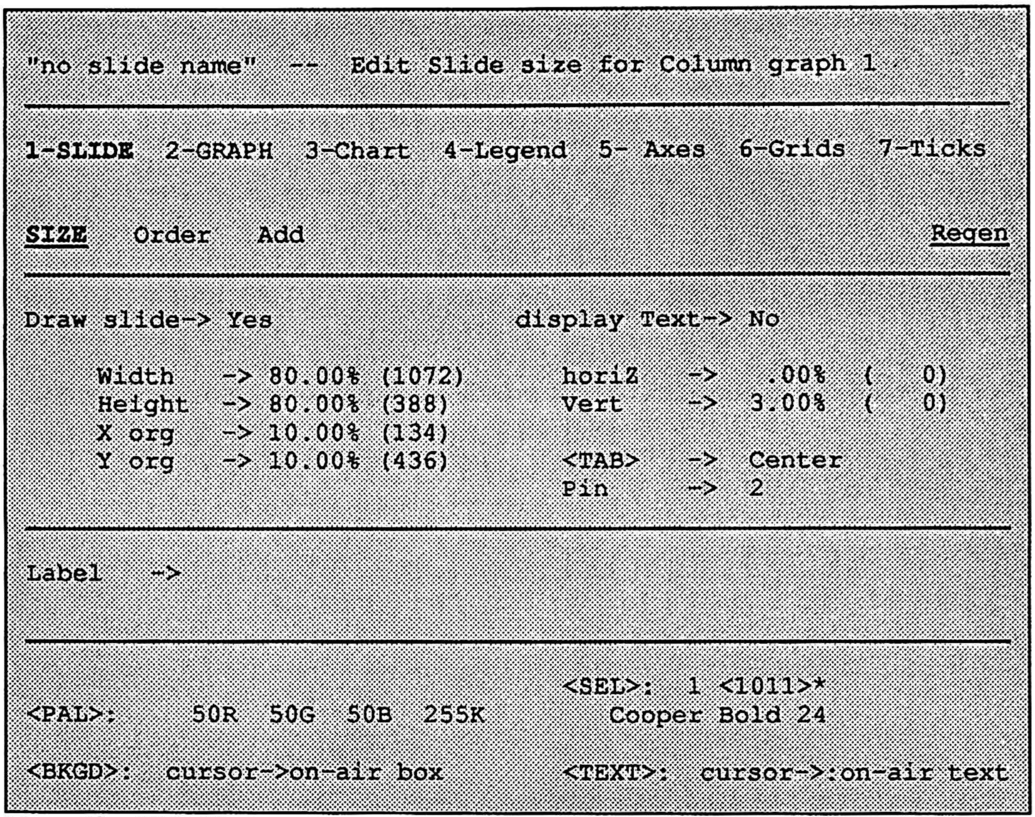
The first time you enter Graphics or just after the current slide format is erased, Graphics displays the eight basic chart styles on the on-air color monitor. It displays a title screen on the preview monitor. After a few seconds, Graphics displays the default slide.

Thereafter, when you re-enter Graphics, the slide you were working on is displayed on the on-air monitor. The last menu that was up is re-displayed on the black-and-white status monitor.

The slide is displayed on the on-air monitor in what computer people call a background process. This means that the computer draws the picture while it is waiting for you to decide what to do next. If you press a key that changes the slide, the computer will instantly start drawing all over again. *You don't have to wait for the slide to finish.* Don't worry when Graphics erases a half-drawn slide and starts over—it is always looking for a better slide to draw.

During the display of the eight basic styles, you can select one by typing its identifying letter. Thus type **B** if you want to start with a bar chart and don't want the startup display to finish.

The first menu you see when you enter Graphics is the `SLIDE SIZE` menu. We discuss the operation of this menu in the next section. Now, we describe the ***title line*** at the top of the status monitor, the ***menu line*** just below it, and the ***sub-menu line*** just below the menu line.



```
"no slide name"  --  Edit Slide size for Column graph 1
________________________________________________________________

1-SLIDE  2-GRAPH  3-Chart  4-Legend  5- Axes  6-Grids  7-Ticks

SIZE   Order   Add                                        Regen
________________________________________________________________

Draw slide-> Yes                display Text-> No

     Width   -> 80.00% (1072)      horiZ   ->    .00%  (    0)
     Height  -> 80.00% (388)       Vert    ->  3.00%  (    0)
     X org   -> 10.00% (134)
     Y org   -> 10.00% (436)       <TAB>   ->  Center
                                   Pin     ->  2
________________________________________________________________

Label    ->

________________________________________________________________

                                   <SEL>:  1 <1011>*
<PAL>:      50R  50G  50B  255K       Cooper Bold 24

<BKGD>:  cursor->on-air box        <TEXT>:  cursor->:on-air text
```

Menu 10: Slide Size

DESCRIPTION OF PRESENTATION GRAPHICS MENU

Title line
Menu line
Sub-menu line
Control Fields
Additional information

2.1 The Title Line

See Menu 10: "Slide Size." The Title line displays:

```
"No slide name" -- Edit slide size for column graph 1.
```

This line displays general status information showing where you are in the editing process:

`"No slide name"`	The name of the slide you are working on. There is no name until you record this slide or read in a new one.
`slide size`	The current menu selection. You are ready to edit the size of the slide.
`column graph`	The chart style of the graph you are editing. Any other selection on the menu line refers to elements of this graph. There may be several graphs in this slide; the title line chart style helps orient you to which one is currently being modified.
`1`	The sequence number within the `SLIDE ORDER` of the graph you are editing. If there are two column charts and a pie chart in this slide, the second column chart could be graph 3.

One entry on the menu is backlit. This is the selected field. Only one field is backlit at a time. The cursor is at that field. The arrows [→] [←] [↑] [↓] move the cursor from one field to another.

Home always returns the cursor to the menu line.

If the current menu selection refers to a drawable object, a blinking rectangle will outline that object on the on-air monitor. This ***on-air cursor*** adjusts the size and position of the object. The size and position can also be entered numerically on the keyboard.

2.2 The Menu Line

See Menu 11, "Slide Size." When the Slide is selected (as it is just after start-up), the menu line displays:

```
1-SLIDE  2-Graph  3-Chart  4-Legend  5-Axes  6-Grids  7-Ticks
```

These seven choices refer to the slide and graph elements that can be selected for editing. The selected menu item is displayed on the status monitor in upper case letters. It is backlit if the cursor is on it (as at start-up). It is underlined if the cursor is somewhere else on the menu.

2.3 The Sub-menu Line

See Menu 11, "Slide Size." When the `SLIDE SIZE` is selected (as it is just after start-up), the sub-menu line displays:

```
     SIZE   Order   Add
```

Move the cursor to select one field for editing. `SIZE` is underlined because although the cursor is not on it, `SIZE` is the selected field.

`REGEN` is displayed at the right side of the sub-menu line. If `REGEN` is not underlined, the slide is not redrawn. Some operators prefer to work without the slide constantly redrawing. **Effect** toggles `REGEN` on and off.

Move the cursor left and right on the menu line. Note what sub-menus correspond to the various menu line options. With the cursor on the menu or sub-menu lines, type the number before a menu line entry (e.g. 5 for Axes) to instantly move the cursor to the last sub-menu choice selected under that menu line entry. The menu/sub-menu choices are summarized below:

MENU	SUB-MENU	PURPOSE
`SLIDE`	`Size`	Adjust size and position of the slide and its associated text.
	`Order`	Observe and change the order in which graphs are drawn on this slide.
	`Add`	Add a new graph to a slide.

The following selections refer to a particular graph within the slide.

GRAPH	Size	Adjust the size and position of the graph and its associated text within the slide.
	Order	Observe and change the order in which elements of the graph are drawn.
	Data	Observe and change the data points for this graph.
	Style	Change the chart style of this graph.
CHART	Foreground	Adjust the size and position of the foreground and its associated text. The foreground text is derived from the point values.
	Edge	Adjust size and position of the edge and its associated text. The edge text is derived from the point value text.
	Drop shadow	Adjust size and position of the drop shadow and its associated text. The drop shadow text is derived from the data percentages.
Legend	________	Adjust size and position of the legend and its associated text. The legend text is the list label.
Axes	X axis	Adjust the size and position of X axis and its associated text.
	Y axis	Same for Y axis.
	Scaling	Change full scale values for either axis as appropriate for the chart style.

`Grids`	`X Big`	Adjust size, position, and spacing for big X grid lines. The text is derived from the scaling values for the X axis.
	`X Little`	Same for little X grid lines.
	`Y Big`	Same for big Y grid lines. Text is derived from Y axis scaling.
	`Y Little`	Same for little Y grid lines.
`Ticks`	`X Big`	Same for big X tick marks.
	`X Little`	Same for little X tick marks.
	`Y Big`	Same for big Y tick marks.
	`Y Little`	Same for little Y tick marks.

2.4 The Control Fields

Cursor Positioning. A field that can be reached by the cursor can only be edited when the cursor is on it. Reachable fields are identified with an arrow ->.

There are two techniques for positioning the cursor. They are used whenever the size menu (such as this `SLIDE SIZE` menu) for an object is displayed on the status monitor.

1. The cursor arrows [→] [←] [↑] [↓] move the cursor from field to field.

   With `SLIDE SIZE` selected, press [↓] until `Yes` in the `Draw box` field is backlit. The cursor is now positioned on the `Draw box` field and the entry can be edited. (We discuss editing a field, below after we explain cursor motion.) Once the cursor is positioned at `Draw box`, the cursor moves down the editable fields in the left-hand column each time you press [↓]. The cursor then moves down the fields in the right-hand column.

[↑] moves the cursor the other direction from [↓] (this is hardly surprising). When the cursor is on the first editable field `Draw box`, [↑] moves the cursor to `SIZE` on the sub-menu line; you can move it further.

[→] and [←] move the cursor between the `Draw box` and `display Text` control fields. [→] and [←] are usually used for editing within these fields.

2. Type the field's upper case letter to send the cursor directly to a field. This works even if the cursor is up in the menu or sub-menu lines. Thus `d` (or `D`) moves the cursor to the `Draw box` field, and `z` moves the cursor to the `horiZ` field. **Tab** moves the cursor to the `<TAB>` field.

Drawing and Coloring the Slide.

To draw or not to draw

Throughout Graphics you'll have the choice whether or not to draw (display) each element of your slide. Move the cursor to the `Draw box` field and press **Next** (or **Prev**) to change the `Yes` to a `No`. Graphics then redraws the slide without the dark grey box. The blinking box still outlines the slide box. Drawing the slide paints a color within the slide box. The boundaries of the box are still calculated and used by other objects that depend on the slide. For example, even if the slide is not drawn, halving its width will halve the width of all objects that depend on it.

Next and **Prev** are toggles with various functions. You'll be using them frequently. In the `Draw box` field, they toggle yes/no.

Use the palette function to change the slide box color. Press **Pal** (the cursor can be anywhere) and the screen is redrawn with the familiar 20-K color bar palette at the top. Change the color of the selected object in much the same way you change colors for 20-K characters.

The selected object is somewhere on the screen. The color of that object changes as you move the palette cursors within the hue, saturation and value bars. **Shift-Char** [↑] and **Shift-Char** [↓] move the palette bars.

If several objects have the same color as the selected one when the palette display is initially created, they all change color as you change the selected color. However, when you press **Enter** or **Compose**, the screen is redrawn with only the color of the selected object changed.

Adjusting Size and Position. The parameters for height, width, X origin, and Y origin specify, in relative coordinates, the size and position of the slide rectangle as percentages of the screen. These parameters are displayed on the status monitor in absolute coordinates within parentheses. Absolute coordinates are not for data entry. They are used when making adjustments with the on-air cursor.

The default slide occupies the entire safe title area of the screen. Strips ten percent wide are left uncovered on the left, right, top and bottom of the screen. Thus, the default height and width of the slide are each 80 per cent of the screen height and width; the X and Y origin of the lower left hand corner of the box are 10% of the screen width and 10% of its height.

As the slide width is 80% of the screen, the X coordinate of the right side of the slide is 90% of the screen width, and, similarly, the top of the screen is 90% of the screen height. The parameters for width, height, and X and Y origin are shown in the left-hand column on the `SLIDE SIZE` menu. Those parameters can be changed to position the slide anywhere within the screen.

Editing a Field. Move the cursor to the `Width` field. Use the cursor arrows or type the letter `W`.

Enter:

40 [↓]	The slide width changes to 40% of the screen width. The screen re-draws when [↓] is pressed and the slide appears on the left half of the screen. The cursor moves to the `Height` field when [↓] is pressed.

Continue with:

40 [↓]	The slide height changes to 40% of the screen height. Graphics redraws and moves the cursor to the `X org` field when [↓] is pressed. The slide now occupies the lower left quarter of the safe title area of the screen.

Continue:

50 [↓] **50** [↓]	the slide moves to the lower right corner of the screen and then to the upper right corner.

The above example shows how to move and position the screen, but doesn't illustrate all the keys that enter data in a field.

The following table summarizes the keys that edit relative coordinate fields:

KEY	PURPOSE
0-9	Data entry
.	Decimal point. Enter fractional percentages.
+ or **-**	Specifies the sign of the data. e.g. a negative x origin moves the lower left corner to the left of the left-hand edge of the screen.
[←]	Moves the cursor left within the field.
[→]	Moves the cursor right within the field.
Del	Deletes the letter over the cursor.
Backspace	Deletes the letter to the left of the cursor.
Insrt	Toggles insert mode.

Any other key enters the typed data. The slide redraws when the data in the field is changed. Thus [↑] enters the data and moves the cursor to the field above the one just edited.

Home	Moves the cursor back to the menu line after entering the data at selected field.
Home	again moves the cursor to the first item of the main menu.

2.5 Additional Menu Information

On-Air Cursor. The slide size and position can also be adjusted using the on-air cursor. Press **Bkgd**, and the menu line reading

```
"<BKGD> cursor->on-air box"
```

is replaced with the (backlit)

```
"<ENTER> cursor->bw monitor"
```

The `<ENTER>` line is backlit and the cursor appears on the on-air monitor. Press **Bkgd** with the cursor anywhere on the status monitor.

On-Air Positioning. To move the slide, press the cursor arrows in the direction you want the slide to go.

[↓]	moves the box down
[↑]	moves the box up
[→]	moves the box to the right
[←]	moves the box to the left

The blinking box moves, but the screen does not redraw until you press **Enter**. When you press **Enter**, the screen redraws, and the slide fills the box exactly wherever the box is. (The cursor returns from whence it came on the status monitor; press **Bkgd** again to make further adjustments.) While the box is moving, the absolute and relative coordinates displayed on the status monitor are constantly updated. Each time you press an arrow, the box moves one pixel to the left or right or one line up or down. Hold down the arrow to make the box move faster.

On-Air Size Change. When the you activate the on-air cursor, a blinking box outlines the slide (or whatever object is selected). A blinking arrow points at the upper right corner of the box. That arrow points to a ***pin position***. The pin position of the on-air cursor box moves during size change operations. To change the pin position, press any number from 1 through 9. There are nine possible pin positions; they are located about the cursor box like the nine spaces in a tic-tac-toe grid, corresponding to the location of the numbers in the numeric keypad to the right side of the keyboard. For instance, pin position "2" is the center of the bottom side of the box, "5" is the center of the box, and "9" is the top right corner.

To change the box size, hold down **Shift** or **Shift-Char** and press any cursor arrow. The pin moves in the direction of the cursor. When pin "2" is selected, **Shift-Char** [←] brings both sides of the box in and **Shift-Char** [→] moves both sides out. Experiment with different pins and different shift directions. You'll find that the box size changes in a predictable way.

Press **Enter** to redraw the slide in the new size (and/or position). To abandon your change once you have started moving the on-air cursor, press **Quit**.

Positioning Text. Each object on the slide has associated text. You can either type the text, or generate it from data or scaling specification. The field `Label->` is at the bottom of the `SIZE` menu. Move the cursor to the label field and enter your text. If the text is derived from other information, the field is identified with `Label:` and the source of that information is shown in the label field.

Text is displayed in the selected font. To change the selected font, press another selector. (The cursor need not be on any particular field to do this.) To change the selected font, quit Graphics, change the font selection and re-enter Graphics.

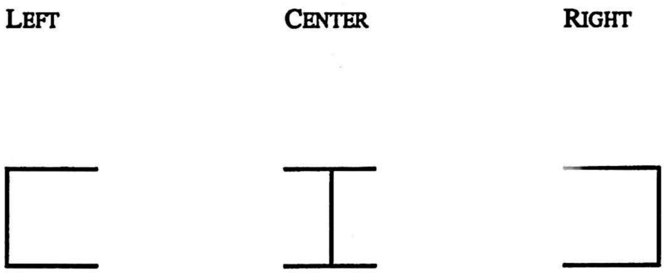
The text for an object is displayed on the on-air monitor only if Graphics is commanded to do so. Move the cursor to the `display Text` field and press **Next** or **Prev** to change the display Text field from `No` to `Yes`.

Text is always displayed on the menu at a tab stop. To select the `tab stop type`, move the cursor to the `<TAB>` field (or press **Tab**). Use **Next** or **Prev** to select the `tab stop type`.

The tab stop depends on one of the ***pin positions*** of the object. The default slide text settings place a center tab located at 5.00% Vertically and 0.00% horiZontally from Pin position 2 just above the bottom center of the slide. Changing the `Pin` to 5 would move the text to just above the center of the slide. Pin position placement is crucial when placing text relative to a bar or column graph. Text placed at pin position 8 of a column is placed above the top center of the column no matter how tall the column may be.

On-Air Text Positioning. The text field is placed on the screen to the accuracy of a pixel or a line with the on-air text cursor. Press **Text** to move the cursor on-air. A backlit message informs you that **Enter** will move the cursor back to the status monitor and redraw the slide with the repositioned text.

The shape of the cursor you see on the on-air monitor reflects the type of the selected tab stop. It indicates the direction of the movement.



The height of the font currently in the selector determines the cursor's height (in lines).

Position the text cursor, then press **Enter**. Graphics re-draws the slide with the text in the new location.

Adjust the size and position of the slide and its text to visualize what each field on the `SLIDE SIZE` menu does to the displayed image. To start over at any time, the keystroke sequence: **Confg I Y** erases the image and displays the default slide as if you started all over again.

We discuss `SLIDE ORDER` and `SLIDE ADD` in Sections 3.12 and 3.13 after we describe all the elements for composing a graph. These two commands create and manipulate multiple graphs on a slide.

3. THE GRAPHS AND CHARTS

When `GRAPH SIZE` menu is selected, a blinking box outlines the graph within the slide on the on-air monitor. The default graph is a somewhat lighter gray than the default slide. The width, height, etc are expressed in terms of their equivalent distances on the slide. Thus the default graph is 70% as high as the slide (which, in turn, is 80% of the screen height). The same commands and operations that adjust the slide adjust the graph.

Several graphs can share the same size and position on the slide. To change the parameters of only one graph, respond with **N** when Graphics asks if you wish to change the same parameter in all of them. If you answer **Y** all the graphs are altered. This permits you to move several overlaid graphs around the screen together.

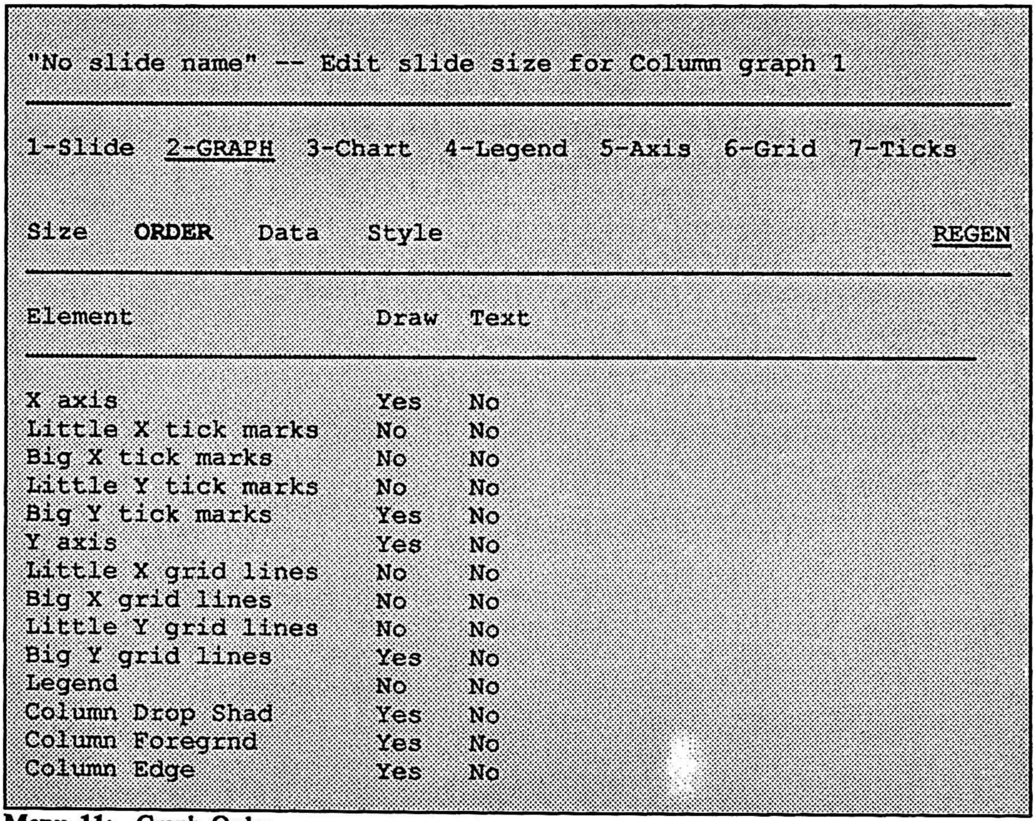
3.1 Graph Order

Select this menu to display a complete list of the elements. The first element on the list is drawn first, the second drawn second, and so on. Elements are drawn on top of one another, so later elements tend to cover up parts of earlier ones.

To change the graph drawing order, move the cursor to an element. One parameter of each element is outlined on the on-air monitor as the element is selected on the status monitor.

To move the selected element, press **Xchg** [↑] or **Xchg** [↓]. The screen redraws reflecting the new order. Changing the drawing order is particularly useful for putting the chart elements (Bars, Columns, etc) *behind* grid lines.

The `Chart Foreground` and `Chart Edge` move together when you press **Xchg**. The `Chart Drop Shadow` is a separate object and need not be placed next to the foreground in the drawing order.



```
"No slide name" -- Edit slide size for Column graph 1
____________________________________________________________

1-Slide  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks

Size   ORDER   Data   Style                                REGEN
____________________________________________________________

Element                   Draw   Text
__________________________________________________________

X axis                    Yes    No
Little X tick marks       No     No
Big X tick marks          No     No
Little Y tick marks       No     No
Big Y tick marks          Yes    No
Y axis                    Yes    No
Little X grid lines       No     No
Big X grid lines          No     No
Little Y grid lines       No     No
Big Y grid lines          Yes    No
Legend                    No     No
Column Drop Shad          Yes    No
Column Foregrnd           Yes    No
Column Edge               Yes    No
```

Menu 11: Graph Order

Turn elements and their associated text on or off from this screen as well as from the menu for each element. To draw an element, move the cursor to the Yes/No field in the `Draw` column. Press **Y** to draw the element, **N** to not draw it, or **Next** or **Prev** to toggle from Yes to No and back again. Follow the same procedure to change the `Text` status.

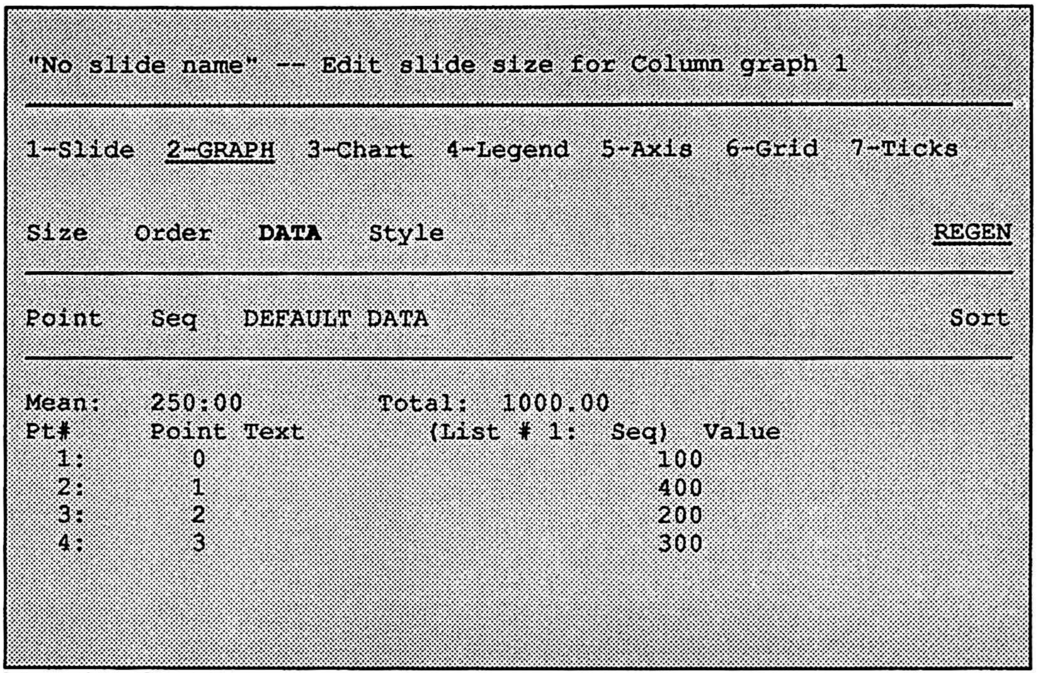
To change the color of an element, move the cursor to the element and press **Pal**. Change the color and **Enter** to return to the `GRAPH ORDER` menu.

To change the size and position of an element, move the cursor to that element and press **Sel-Disp** to select it. The size menu for the element is displayed, and you can make changes.

To change the selector used to display the text of an element, move the cursor to that element and press **Sel**.

3.2 Graph Data

The `GRAPH DATA` menu displays the data on more than one page, if necessary. The first twelve points are on the first page. To view additional points, [↓]. To move a page at a time, press **Shift-Row** [↑] or **Shift-Row** [↓]. To edit point values and point text, move the cursor to a field and type in the new data.



```
"No slide name" -- Edit slide size for Column graph 1
--------------------------------------------------------------------
1-Slide  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks

Size   Order   DATA   Style                                   REGEN
--------------------------------------------------------------------
Point   Seq   DEFAULT DATA                                     Sort
--------------------------------------------------------------------
Mean:     250:00         Total:  1000.00
Pt#       Point Text         (List # 1:  Seq)  Value
  1:         0                                  100
  2:         1                                  400
  3:         2                                  200
  4:         3                                  300
```

Menu 12: Graph Data

The first line of the Graph Data menu contains the word `POINT`, a ***list type*** identifier, and the ***list title***. `POINT` serves as a placeholder. [↓] moves to `POINT`; [↓] again moves to the data.

To change the `LIST TYPE` or its title, use [→] when the cursor is on `POINT`.

When the cursor reaches the `LIST TYPE` identifier (default `TYPE` is `Seq`), Graphics displays them. To select a `TYPE`, type the upper-case letter. (See the end of this section for a full description of the `LIST TYPE` change procedure.) The list title is displayed as the legend text. It can be edited either on this menu, or on the `LEGEND` menu. The default title is `DEFAULT DATA`.

To sort the data, move the cursor to `SORT`, then press [←] when the cursor is on `POINT` or `<TAB>`. Sorts are described below.

Graphics displays the list's mean and total. The mean and total are computed from the numbers (excluding non-numeric characters) in the data values.

The data list initializes to a sequence (starting from zero in steps of one) of four points of value 100,400,200, and 300. Change these values to match whatever data you wish to plot. Move the cursor to a data value field and enter a new number.

NOTE: Enter any non-numeric characters in a data value field; Graphics displays whatever text you enter as a data value label, e.g. 100 dollars. Graphics throws away non-numeric characters and uses all the numbers to plot the data.

To ***delete a data point***, move the cursor to the point, **Alt Del** and answer `Are-you-sure?` with **Y.** Graphics resequences the data points, if appropriate.

To ***insert a new point***, move the cursor to the point *after* the position at which you wish to enter the new data, and press **Alt Insrt**. Graphics re-sequences the list, if necessary.

To add a point to the end of the list, move the cursor there and just start typing. To exchange the order of points, move the cursor to the point and press **Xchg** [↑] or **Xchg** [↓].

Coloring Data. Assign a color to data points. Move the cursor to a data point and press **Pal.** The palette works like the 20-K palette with these additional functions:

`K`	Keeps the color under the cursor. If you move the cursor to another color,
`P`	Puts the Kept color back into the palette.
`L`	Loads the element's original color, or if you've previously pressed **P,** pressing **L** loads the color on the palette just prior to the "Put."

Make a color selection on the palette then press **Enter or Compose** to return to the `GRAPH DATA` menu. The data point is marked with a `C` to signify that color has been added.

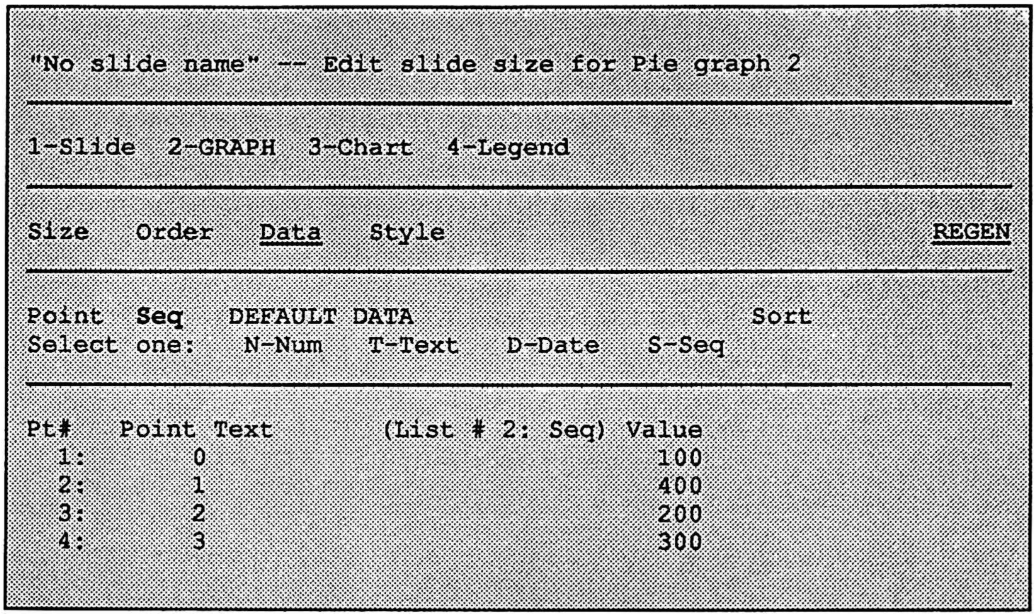
Colored data points have the following effect on various chart styles:

TYPE	EFFECT
`BAR`	Data color takes priority over the `CHART FOREGROUND` color. Use the data point color change to highlight a bar.
`COLUMN`	Same as `BAR`.
`PIE`	The color of the data point colors the corresponding slice.
`STACKED BAR`	The color of the data point colors the corresponding segment. Edge saturation and value are drawn from the `CHART EDGE` colors.
`STACKED COL`	Same as `STACKED BAR`s.

Other chart styles are not affected by the color of the point.

To ***delete a color*** (restore default coloring) place the cursor on the point, press the **Pal**, and then press **Quit**. The `C` disappears, and the bar (or column) returns to the default color.

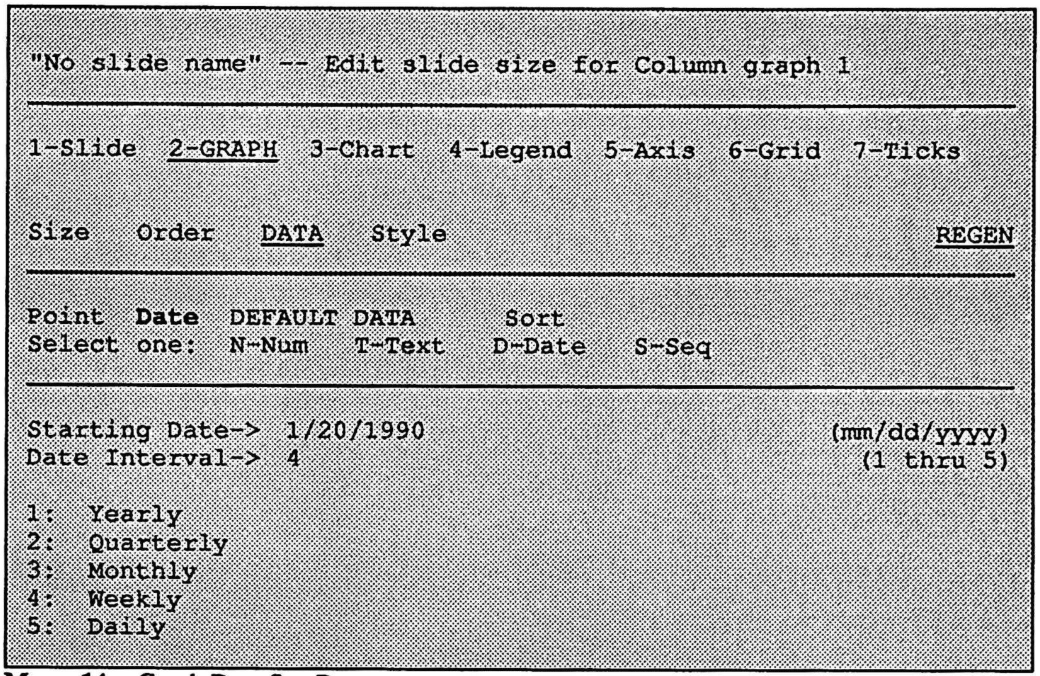
Sequencing Data. There are four possible ***list types.*** To select one, move the cursor to the parameter just to the right of `Point`.



```
"No slide name" -- Edit slide size for Pie graph 2

1-Slide  2-GRAPH  3-Chart  4-Legend

Size   Order   Data   Style                                  REGEN

Point  Seq   DEFAULT DATA                          Sort
Select one:   N-Num   T-Text   D-Date   S-Seq

Pt#   Point Text        (List # 2: Seq) Value
  1:        0                           100
  2:        1                           400
  3:        2                           200
  4:        3                           300
```

Menu 13: Graph Data-Seq

`N-Num`	Enter the X value (to be plotted along the X scale) in the `Point text` field. This value may have non-numeric characters—they are ignored when the point is scaled. Each point has an `X` and `Y` value.
`T-Text`	Enter the point text in the `Point text` field. Use any font character. A text data list cannot be used for double-valued charts (line, fill scatter).
`D-Date`	Graphics displays two menus to prompt through the date entry procedure. Specify the starting date, an interval to increment the date between points, and an output format.



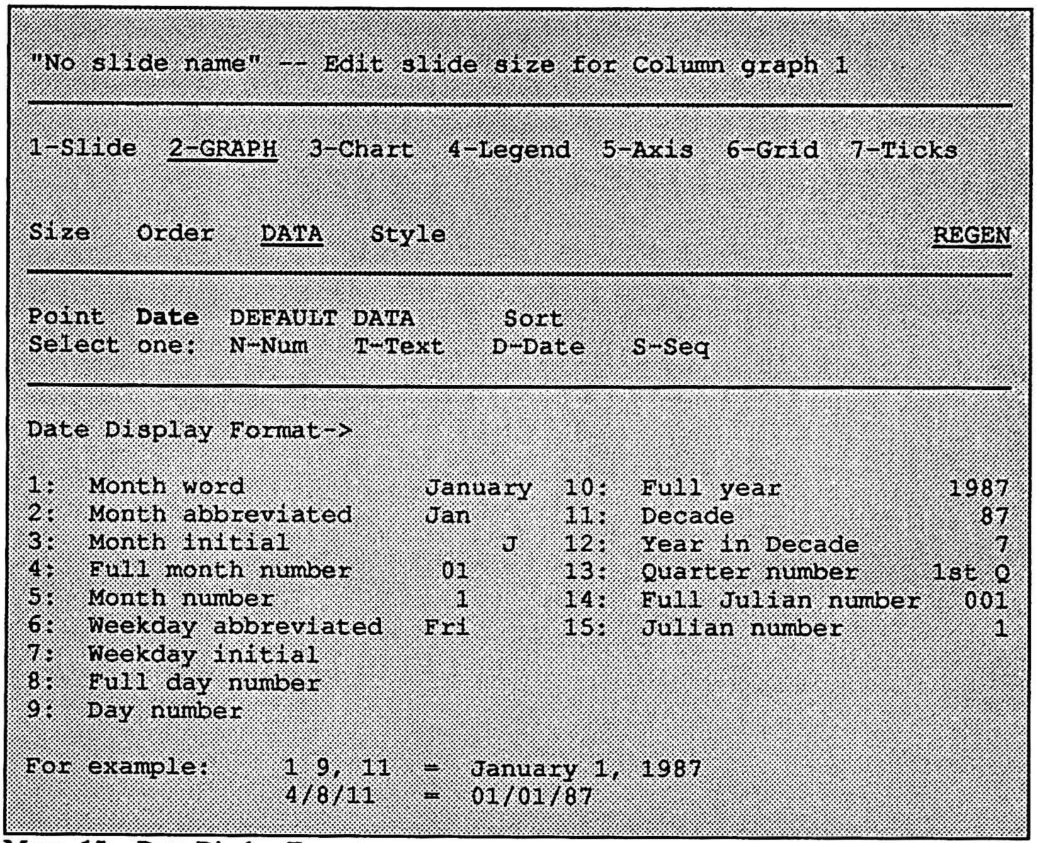
```
"No slide name" -- Edit slide size for Column graph 1
--------------------------------------------------------------
1-Slide  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks

Size   Order   DATA   Style                               REGEN
--------------------------------------------------------------
Point  Date  DEFAULT DATA     Sort
Select one:  N-Num   T-Text   D-Date   S-Seq
--------------------------------------------------------------
Starting Date-> 1/20/1990                          (mm/dd/yyyy)
Date Interval-> 4                                   (1 thru 5)

1:  Yearly
2:  Quarterly
3:  Monthly
4:  Weekly
5:  Daily
```

Menu 14: Graph-Data-Seq-Date

Enter the starting date in the numeric form MM/DD/YYYY. Leading zeros may be omitted, but 1990, for example, must be typed in full.

To select one of the `Date intervals`, enter the number of the interval TYPE.

After you specify the interval, Graphics displays a new menu to specify the date output format. The numbers 1 through 15 select parts of the date format. Any other characters are simply output. Two examples are shown at the bottom of the status monitor screen.

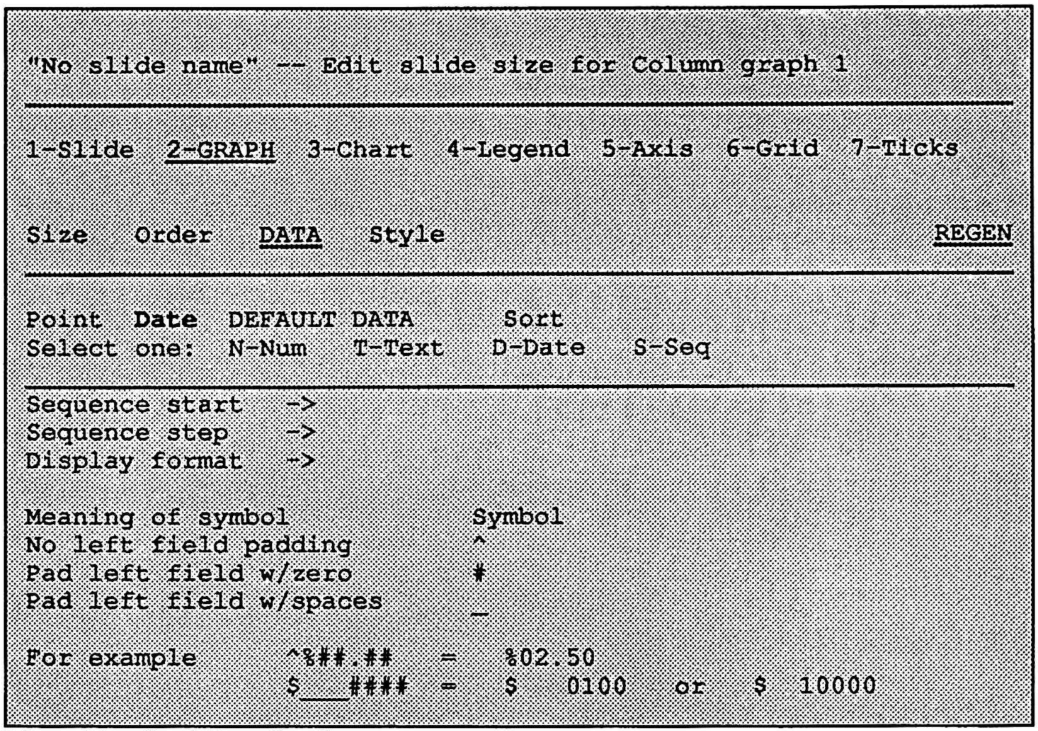


```
"No slide name" -- Edit slide size for Column graph 1
________________________________________________________________

1-Slide  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks

Size   Order   DATA   Style                                REGEN
________________________________________________________________
Point  Date  DEFAULT DATA      Sort
Select one:  N-Num   T-Text   D-Date   S-Seq
________________________________________________________________

Date Display Format->

1:  Month word              January  10:  Full year              1987
2:  Month abbreviated       Jan      11:  Decade                   87
3:  Month initial                J   12:  Year in Decade            7
4:  Full month number        01      13:  Quarter number        1st Q
5:  Month number              1      14:  Full Julian number      001
6:  Weekday abbreviated     Fri      15:  Julian number             1
7:  Weekday initial
8:  Full day number
9:  Day number

For example:      1 9, 11  =  January 1, 1987
                  4/8/11   =  01/01/87
```

Menu 15: Date Display Format

See Section 4, "Other Keys," **Confg L**, for foreign language date entry.

`S-Seq` Graphics displays a new menu.



```
"No slide name" -- Edit slide size for Column graph 1
------------------------------------------------------------------
1-Slide  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks

Size  Order  DATA  Style                                    REGEN
------------------------------------------------------------------
Point  Date  DEFAULT DATA      Sort
Select one:  N-Num   T-Text   D-Date   S-Seq
------------------------------------------------------------------
Sequence start   ->
Sequence step    ->
Display format   ->

Meaning of symbol            Symbol
No left field padding        ^
Pad left field w/zero        #
Pad left field w/spaces      _

For example      ^%##.##   =   %02.50
                 $___####  =   $   0100   or   $  10000
```

Menu 16: Graph-Data-Seq-Seq

Specify the sequence start, the interval, and the output format:

Enter the starting value in the `Sequence start` field.

Enter the interval in the `Sequence step` field. The first data point will be given the value of the start, the second start + step, etc.

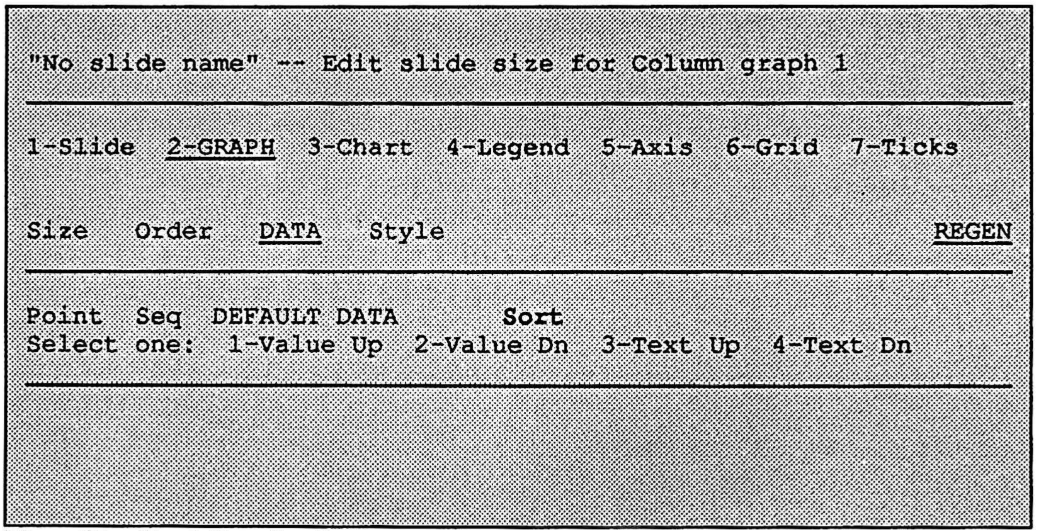
The text for the `Point Text` is controlled in the `Display format` field. Any character not mentioned under `Meaning of symbol` is displayed in the `Point Text` field and on the chart.

A caret (^) is replaced with a non-zero number. If the number is zero, nothing is output and this symbol can be used to left-justify fields.

A number sign (#) is replaced by a number even if that number is zero.

An underscore (_) (Shift/hyphen) is replaced by a non-zero number. A space is output if a zero is present.

Sorting Data. Tab moves the cursor to `SORT`. Graphics displays the various ways to sort the data points.



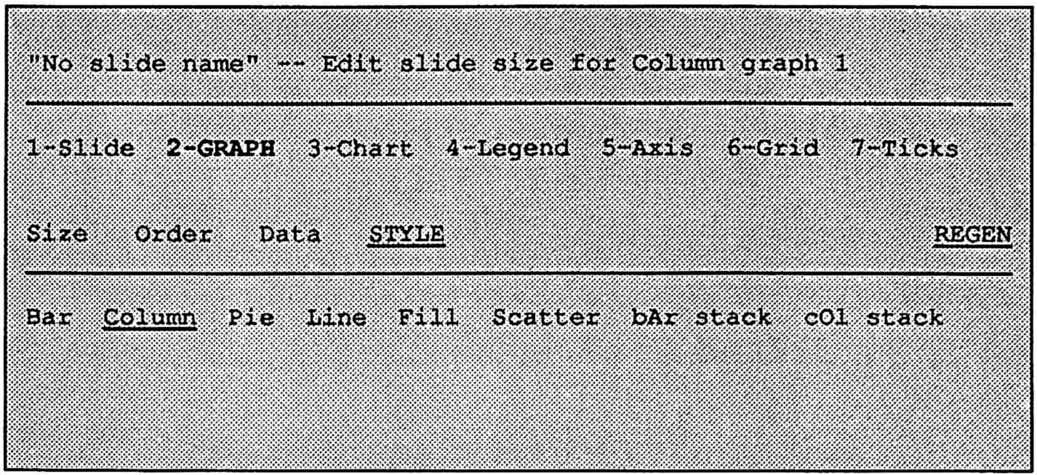
```
"No slide name" -- Edit slide size for Column graph 1
________________________________________________________________
1-Slide  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks

Size   Order   DATA   Style                                REGEN
________________________________________________________________
Point  Seq  DEFAULT DATA      Sort
Select one:  1-Value Up  2-Value Dn  3-Text Up  4-Text Dn
________________________________________________________________
```

Menu 17: Graph-Data-Seq-Sort

`1-Value Up`	sorts in ascending order by `value`, (lowest first).
`2-Value Dn`	sorts in descending order by `value` (highest first).
`3-Text Up`	sorts the data by the `Point text` field in ascending order.
`4-Text Dn`	sorts the data by the `Point text` field in descending order.

3.3 Graph Style

Use the GRAPH STYLE menu to change the chart style. We've *hidden* them under GRAPH to avoid accidental changes. When this menu is selected, the status monitor lists the eight basic chart TYPEs. The selected chart style is underlined. When you move the cursor to it, the chart style is selected and backlit. To change the chart style for this graph, move the cursor to highlight a different style or type the capitalized letter of the style.



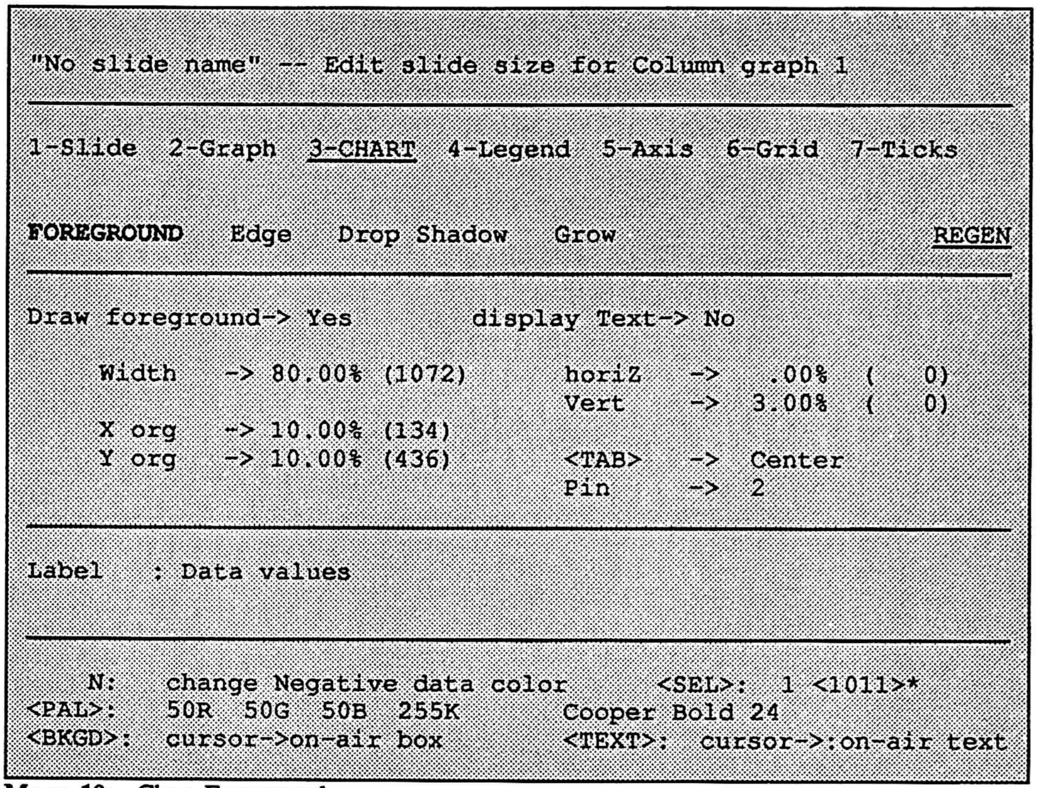
```
"No slide name" -- Edit slide size for Column graph 1
______________________________________________________________________
1-Slide  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks

Size   Order   Data   STYLE                                      REGEN
______________________________________________________________________
Bar  Column  Pie  Line  Fill  Scatter  bAr stack  cOl stack
```

Menu 18: Graph Style

When a new chart style is selected, Graphics provides a default example of the new style that plots the same data points as the old style. Thus you can see *what if* the data were plotted in a different style.

If the original graph was changed from its default settings, a ninth selection—`Recover`—appears at the end of the list of possible styles. If you select `Recover`, the original graph reappears. Don't rely too heavily on this feature; it is only one level deep. If you select a new style and then edit it, the original will be lost. To be safe, record the original (See Section 5, "Recording and Reading.") before you start changing a new style.

3.4 Chart Foreground



```
"No slide name" -- Edit slide size for Column graph 1
______________________________________________________________

1-Slide  2-Graph  3-CHART  4-Legend  5-Axis  6-Grid  7-Ticks

FOREGROUND  Edge  Drop Shadow  Grow                      REGEN
______________________________________________________________

Draw foreground-> Yes        display Text-> No

     Width   -> 80.00% (1072)      horiZ   ->   .00%  (    0)
                                   Vert    ->  3.00%  (    0)
     X org   -> 10.00% (134)
     Y org   -> 10.00% (436)       <TAB>   ->  Center
                                   Pin     ->  2
______________________________________________________________

Label   : Data values

______________________________________________________________

    N:     change Negative data color      <SEL>:  1 <1011>*
<PAL>:     50R  50G  50B  255K       Cooper Bold 24
<BKGD>:    cursor->on-air box        <TEXT>:  cursor->:on-air text
```

Menu 19: Chart Foreground

You can manipulate size, position and color (provided data point colors are not marked as entered: `C`) in the `CHART FOREGROUND` menu. See `GRAPH DATA, Coloring Data`. Many operations are the same for each of the chart styles; exceptions are detailed below under each style. Our initial discussion assumes a column chart style.

The `X org` and `Y org` fields adjust the position of the chart style objects relative to the graph. If X is changed to 2.00%, all the columns move to the right by that amount. This change gives the illusion of depth when several edged (3-D) columns are plotted together. An `X org` change moves the front of the column, its edge and its drop shadow together.

The text parameters (right-hand column of the size control field) control the display and positioning of the data values entered in the data point list. Proper pin positions put the value text at the top of the columns.

Column Chart. One column is drawn for each data point in the `GRAPH DATA` list. The size of the graph, the vertical scaling, and the actual data point value determines the height of the column. The width of the column specifies how much of the available ***living room*** is used by the column. The actual column width, in pixels, depends on how many columns (and how many data points) are drawn. A width of 10% creates very skinny columns; a width of 100% creates a wall.

Press **Pal** to change the color of the whole column. While you are changing the color with the palette menu, the color of the front face of the bar changes. When you **Compose** (or **Enter**), Graphics sets the hue of each edge color to match the hue of the front face. Graphics also changes the saturation and value of the edge colors to preserve the 3D column shading. The RGB value displayed on the `CHART FOREGROUND` menu describes the front face of the column.

Bar Chart. Bar charts behave very much like column charts. Scaling and data values determine the bar width; the bar height can be specified on the menu. Colors for bars are selected the same way as colors for columns.

Pie Chart. Use the `x origin` and `y origin` fields to position the pie charts on the screen. The values in these fields locate the center of the chart.

Use the `Height` field to change the pie chart size. Graphics expresses the height of the chart as a percentage of the graph height.

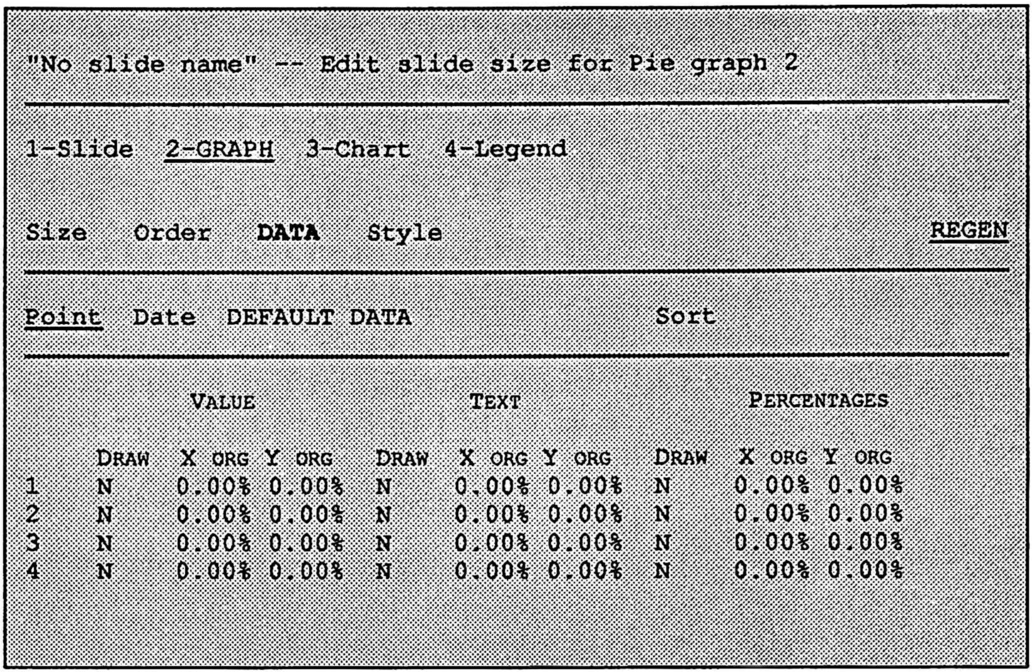
Use the `Width` field to change the circularity of the pie chart. The width is expressed as a percentage of the height of the chart.

> A width of 100% generates a circle—the height equals the width.
>
> A width of 200% generates an ellipse twice as wide as it is high.

Large width percentages (eccentricity) requires a reduction in the height of the chart to keep it on the screen.

The colors of the pie chart slices always come from the color of the data points. Use the `GRAPH DATA` menu to change the colors of the pie points.

Graphics draws a plain disk of the top edge color if there are no points in the data list.



```
"No slide name" -- Edit slide size for Pie graph 2

1-Slide  2-GRAPH  3-Chart  4-Legend

Size   Order   DATA   Style                              REGEN

Point  Date  DEFAULT DATA                  Sort

           VALUE                   TEXT                  PERCENTAGES

     DRAW  X ORG  Y ORG    DRAW  X ORG  Y ORG    DRAW  X ORG  Y ORG
1    N     0.00%  0.00%    N     0.00%  0.00%    N     0.00%  0.00%
2    N     0.00%  0.00%    N     0.00%  0.00%    N     0.00%  0.00%
3    N     0.00%  0.00%    N     0.00%  0.00%    N     0.00%  0.00%
4    N     0.00%  0.00%    N     0.00%  0.00%    N     0.00%  0.00%
```

Menu 20: Pie Graph Data

Data point values, text or percentages can be displayed on a pie chart. All text for each slice is positioned relative to a *pin* at the center of the outside arc of the slice. To move text, move the cursor to the data point corresponding to the slice on the `GRAPH DATA` menu. Press **Text**, and the menu displays the X and Y positions for value, text and percentages. Enter offsets in the appropriate field to move the text on the pie chart. Text for individual slices can be turned on **Y** or off **N.**

Text works on the `GRAPH DATA` menu only if a pie chart is selected.

Choose the parameters for value, text or percentage on the `CHART FOREGROUND`, `EDGE` or `DROP SHADOW` menus respectively. The **Yes** response for `display Text` on one of these menus displays all the slice text corresponding to that screen. Therefore, you can quickly enable or disable all the text type for the entire pie chart.

Fill Chart. You can move `Fill charts` relative to the graph by entering non-zero values in the `X org` or `Y org` fields. There is no height or width parameter needed to modify the shape of the data plot.

The fill chart is ***double-valued***, and shares certain characteristics with other such charts. (See "Double Value Charts" in Section 1.1.) The data value text has no pin position—the tab stop is positioned about the single point at which the data is plotted. Data point lists of `TYPE Text` cannot be plotted—there is no second value for scaling.

If the fill border drops below the X axis, the ***Negative color*** is used. If you wish the top and bottom of such a chart to be the same color, set the negative color to the same values as the Chart Foreground color.

Line Chart. Move line charts with the `X org` and `Y org` fields. The `Width` field controls the width of the line as a percentage of the graph height. 2% generates a thin line, 20% a fat one.

Scatter Chart. In a scatter plot, a character is centered at the point at which the data is plotted. Select that character on the `CHART FOREGROUND` menu. Enter the `Char` and `Selector` fields to pick the scatter character. The scatter character has its own selector field. To choose the scatter character selector, move the cursor to the `<Sel>` field with [↓] or type **S**, and press **Next** or **Prev** until the desired selector is displayed. The BULLET font is a good source of scatter characters.

To choose the scatter character itself, [↓] or type **C** to move the cursor to the `Char` field and type the appropriate character.

3.5 Chart Edge

Use an edge to make chart objects appear three dimensional. An edge usually has two colors and is offset from the foreground to create a 3-D illusion.

The text fields for the edge control the placement of the data text. Even if an object has no edge, the edge text control field displays text on the chart. The edge text horiZontal and Vertical positioning is computed relative to the location of the foreground, not the edge itself. This permits more consistent alignment of tab stops.

Column Chart. The column edge creates the appearance of rectangular prisms. To position the column edge relative to the front face of the column, change its `x org` and `y org`. The origin fields move the foreground in an opposite direction from the edge field entry. An edge X origin of 2% moves the foreground 2% to the left (negative direction). Graphics does this so the back face of the 3-D column appears to lie against the chart grid with the column sticking forward in space.

The default column chart has *northeast* column tops (they extend up and to the right). The drop shadow is placed so the bar appears lighted from the left. When you change the sign of the X or Y edge displacement, Graphics changes the sign of the drop shadow displacement to preserve consistent lighting.

There are two edge colors—the top face color and the vertical face color. Type **C** to change the top color; press **Pal** to change the vertical face color. The *saturation and value of the edge colors* combine with the *hue of the foreground* to create the actual colors drawn.

Bar Chart. Bar chart edge placement and sizing is similar to the edge placement and sizing of column charts. **C** changes the top face (the brighter one) and **Pal** changes the vertical face.

Pie Chart. The pie chart edge gives the illusion of a vertical cylinder with the slices drawn on the circular top. Draw the pie chart foreground as an ellipse for an even better 3-D illusion. It appears to recede in space. The edge can only be displaced downward, so only the `Y origin` field is present on the status monitor menu.

The pie chart edge has two colors—the color of the top disk on which the slices are drawn, and the color of the vertical side of the cylinder. Type **C** to change the top color or press **Pal** for the side.

Fill, Line and Scatter Charts. There are no edges for these charts. The edge text control field places the data text on the screen.

3.6 Chart Drop Shadow

The drop shadow need not be the same size as the foreground; use the `Height` and `Width` fields to change the drop shadow shape. The drop shadow height and width are expressed as a percentage of the graph size. The drop shadow behaves properly with different sized columns or bars. If the `Height` and `Width` fields are zero, the drop shadow is the same size as the foreground. A Height of 5% makes all drop shadows 5% taller than their corresponding foregrounds.

Use the `X org` and the `Y org` to move the drop shadow relative to the chart object. A positive X displacement moves the drop shadow right; negative moves it left. Positive Y moves the drop shadow up and negative Y moves it down.
The text selector and positioning fields control the placement of the data value percentages (particularly useful for pie charts and stacked columns and bars). If the point being plotted is 100 out of a total list sum of 1000, Graphics displays `10.0%` The text position is computed relative to the object foreground, *not* the drop shadow.

There is no drop shadow for a scatter chart—the scatter plot character itself has its own. There is no drop shadow for a fill chart.

3.7 Chart Grow

Column charts and bar charts can be *grown*. Graphics asks if you wish to grow all bars at once (one after the other) or one at a time with a pause between each bar. Type **Y** to grow one at a time and anything else to grow them one after another. When the slide is ready to grow, Graphics prompts for a speed from 1 (slow) to 9 (fast). The bar or column then grows onto the slide. Text for the bar pops on after the bar is grown.

Any object or text drawn on top of the bar is revealed during the growing process. Any object or text within the top edge or drop shadow also grows with the bar. Experiment to get the effect you like.

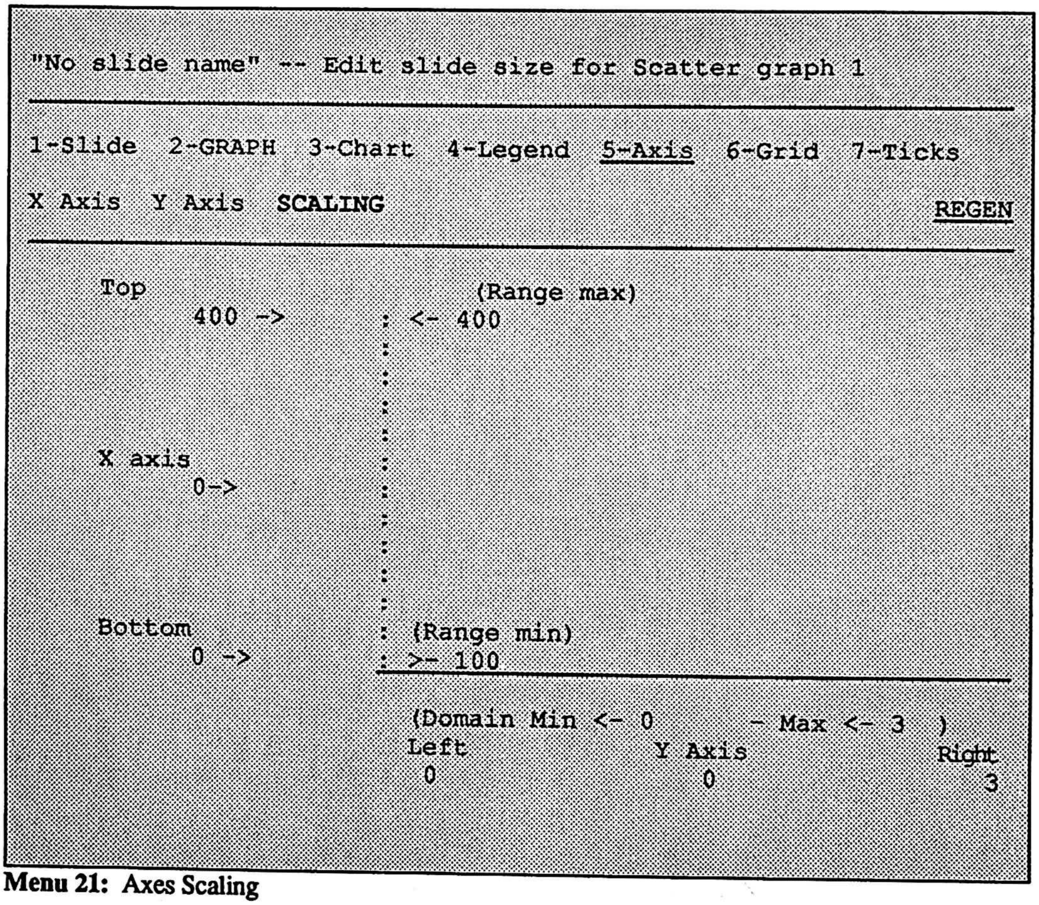
3.8 Legend

The legend identifies the color used in the data plot. The size and position of the legend box is controlled from the legend menu. The edge and drop shadow of the legend are drawn if they are present in the chart itself and have the same offsets as those specified in the chart. The legend box, its edge, and drop shadow, have the same colors as in the chart itself. The size and position fields are expressed as percentages of the graph. You can move the legend (or any other object) off the graph by specifying a position of less than 0% or greater than 100%.

The legend text is the list name. Edit text on the legend menu as well as on the `GRAPH DATA LIST` menu. When edited on either menu, the text changes on both.

3.9 Axes

Scaling. Axis scaling determines where the axes, grid lines and tick marks are on the graph and where the data points are plotted. Scaling is required for all chart styles except pie charts. Graphics creates a reasonable default scale from the data points; the X and Y scale can be adjusted, within limits, on the `AXES SCALING` menu. The output format may include decimals so long as the numbers (excluding decimals) are within range. (Thus 1000, 100.0, 10.00 and 1.00 are all acceptable entries for a top scaling of 1000).



```
"No slide name" -- Edit slide size for Scatter graph 1

1-Slide  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks
X Axis  Y Axis  SCALING                                REGEN

     Top                       (Range max)
          400 ->         : <- 400
                         :
                         :
                         :
                         :
     X axis              :
          0->            :
                         :
                         :
                         :
                         :
     Bottom              : (Range min)
          0 ->           : >- 100
                           (Domain Min <- 0       - Max <- 3  )
                           Left            Y Axis          Right
                            0                0                 3
```

Menu 21: Axes Scaling

The menu shows Top (maximum) and Bottom (minimum) scale for the Y axis and Left (minimum) and Right (maximum) scale for the X axis. It also shows an axis value. The data range in Y and the data domain in X are also displayed for information. These ranges are the maximum and minimum data values from the data list for the graph. Domains are maximum and minimum data text values. Scaling pairs are omitted for bar and column charts as appropriate. Use [↓] and [↑] to move the cursor to the field you wish to change or type the capitalized letter of a field label to get there immediately.

We'll use the Y axis scaling as an example; the X axis scaling behaves similarly. The maximum (Top) scale value *must* be greater than or equal to the maximum data value. This rule is enforced to keep the top of the graph on the screen. The minimum (Bottom) value may be greater than the smallest data value. Points less than the minimum scale value are not plotted. (For a column chart, no column is drawn for that data point and an empty space is left on the graph.)
To specify where the X axis intersects the Y axis, enter a number in the `X axis` field. The field is usually zero, but if you enter **200**, the X axis will be plotted at 200, and the columns (or bars, etc) will be drawn up and down from there. Enter **M** to plot around the mean of the data.

The X axis is placed on the screen at a Y scale value of 0 if the 0 point is within the vertical graph boundary. If the 0 scale value is not within the graph boundary, the X axis is placed at the top or bottom edge of the graph. Some examples:

Case	Top Scale	Bottom Scale	Axis Position
1:	400	100	At bottom of graph
2:	400	0	At bottom of graph
3:	400	-100	20% up from the bottom of the graph
4:	400	-400	50% up from the bottom (middle)

The following cases are created if all the data points have negative values:

5:	0	-400	At top of graph
6:	-100	-400	At top of graph

In double valued charts (line, fill or scatter), the scaling determines where the data points land. Graphics then plots the chart. Column charts are drawn from the axis to the data point. Thus columns draw up from the axis in cases 1 and 2; draw down in 5 and 6; and draw up or down depending on whether the data point value is positive or negative in 3 and 4.

If other graphs share the same scaling, Graphics asks if you want to change the scaling for those other graphs. If you answer **Y** to the question, those other graphs are given the same scaling.

X axis, Y axis. Enter the `5-Axes, X axis` and the `5-Axes, Y Axis` menus to change the size and position of the X and Y axes. The scaling determines the initial axis position—the `X origin` and `Y origin` fields give a displacement from that initial position.

You can label each axis in the `Label` field.

There are no axes for pie charts.

3.10 Grid Lines

X Big, X Little Y Big, Y Little. Grid lines create *graph paper* to serve as a background for the chart plot. Their size and position are adjusted in the same manner as other objects. Grid lines do have an additional field—`Spacing`—that controls the distance between each grid line. Spacing is entered in scaling units. If the X axis scaling is 0 to 400, a spacing of 100 places X grid lines at 100, 200 and 300.

Text for the grid lines is derived from the scaling for the axis that the grid line is associated with. If the X axis scaling is 0-400, and the X big (or little) grid lines are spaced at 100, the grid lines will be labeled successively 100,200, and 300 if the `display Text` field reads `Yes`. As the text is derived from the axis scaling, there is no entry field for the label.

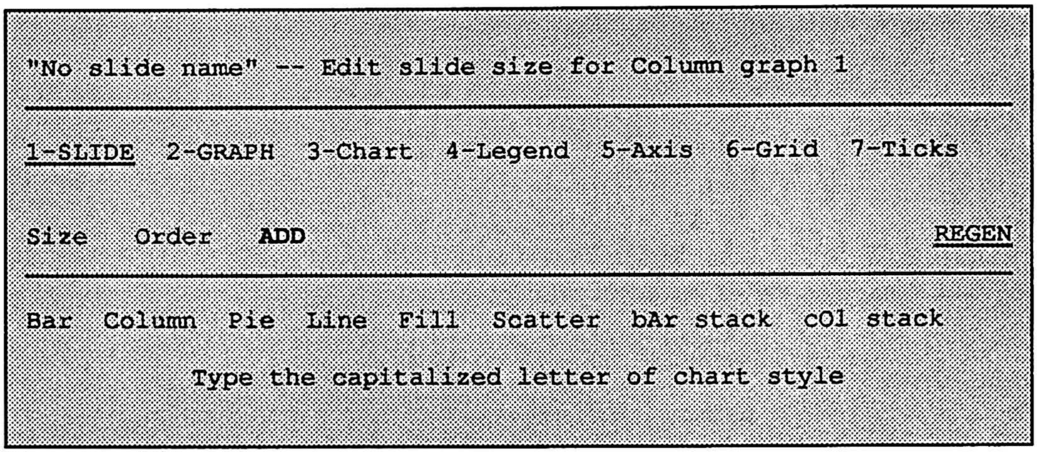
Graphics does not normally display text for the axis itself—no text is displayed for the grid line (or tick mark) that corresponds to the axis. These are the X axis for Y grid lines and the Y axis for X grid lines. To display text for the axes, press **Next** or **Prev** until `Axis` appears in the `display Text` field.

3.11 Tick Marks

X Big, X Little Y Big, Y Little. Use tick marks as anchors for text along the axes. Color them differently from the corresponding grid line. You can also extend them in length to serve as drop shadows for the grid lines. They follow the same positioning and spacing rules as the grid lines. Like the grids, the text for tick marks is derived from the axis scaling.

3.12 Slide Add

Multiple graphs build more complex slides. You can have up to 12 graphs, each with its own list of data points, on one slide. To add a graph to a slide, select the `SLIDE ADD` menu and type the capitalized letter of a chart style. (You can always change this later on the `GRAPH STYLE` menu.) Graphics adds the new graph to the slide order and will be the last one drawn when the slide is redrawn. The graph is ready to be edited.



```
"No slide name" -- Edit slide size for Column graph 1
------------------------------------------------------------------
1-SLIDE  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks

Size   Order   ADD                                          REGEN
------------------------------------------------------------------
Bar  Column  Pie  Line  Fill  Scatter  bAr stack  cOl stack

          Type the capitalized letter of chart style
```

Menu 22: Slide-Add

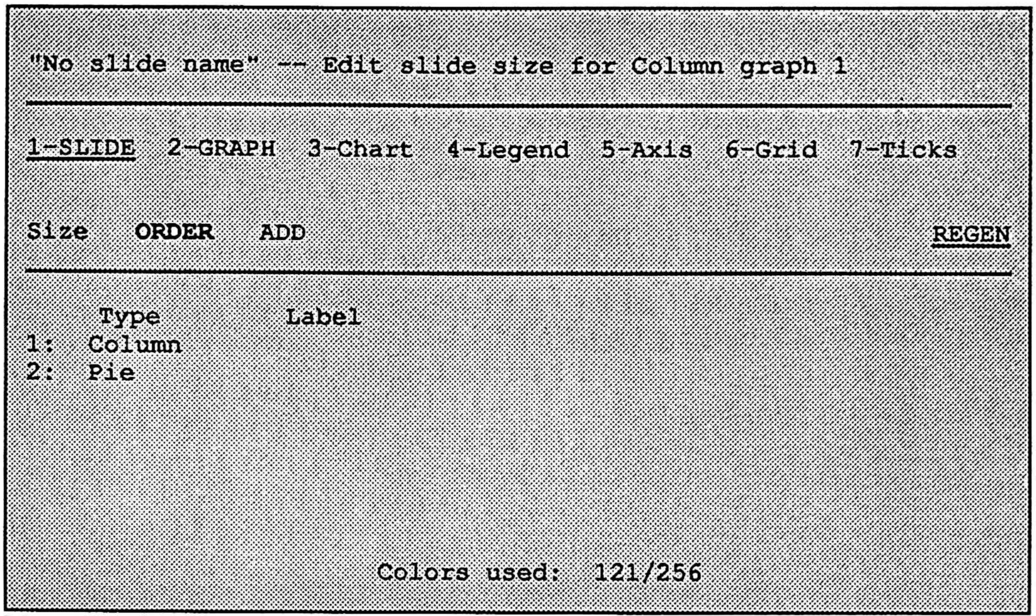
When there is more than one graph on a slide,

Alt Next	selects the next graph
Alt Prev	selects the preceding graph

The title line displays the number and type of the selected graph.

3.13 Slide Order

The `SLIDE ORDER` menu displays the list of graphs in their drawing order. Each graph is identified by its chart style and its graph label. Graphics draws the graph at the top of the list first; the one at the bottom last. To change the drawing order, move the cursor to a graph and press **Xchg** [↑] or **Xchg** [↓]. This feature is particularly useful when changing the drawing order of several overlaid bar or column charts.



```
"No slide name" -- Edit slide size for Column graph 1

1-SLIDE  2-GRAPH  3-Chart  4-Legend  5-Axis  6-Grid  7-Ticks

Size   ORDER   ADD                                        REGEN

      Type         Label
1:   Column
2:   Pie

                      Colors used:  121/256
```

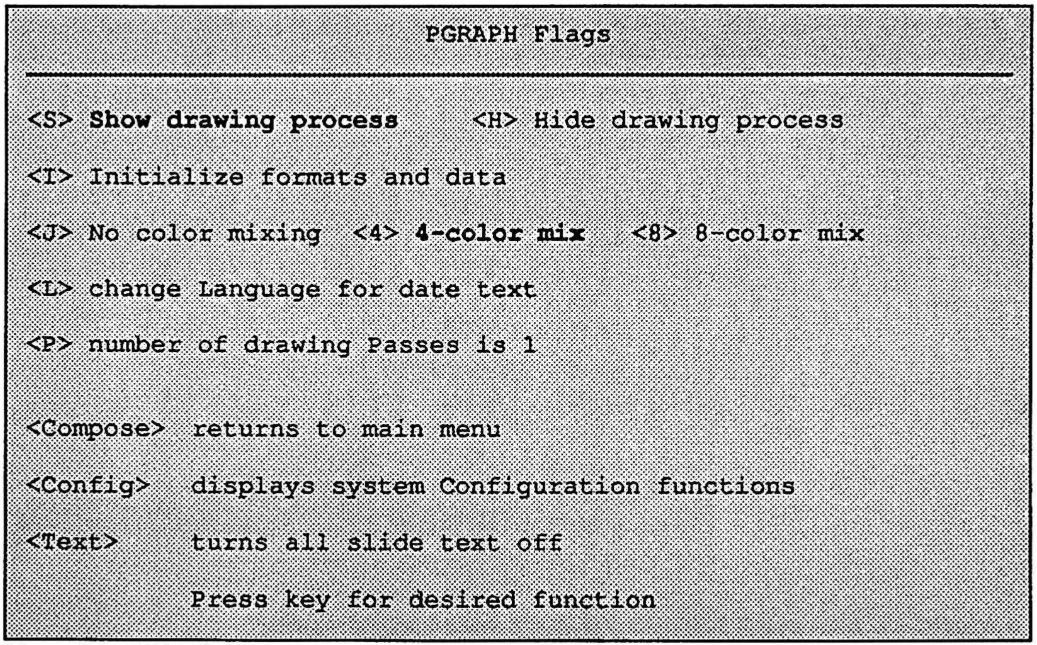
Menu 23: Slide-Order

Alt Del Y deletes an entire graph from the slide. Be careful—the graph *and its data points* will disappear.

When you move the cursor from the sub-menu line to the graph list, the cursor first moves to the currently selected graph. The cursor movement up and down the list selects the various graphs. If you move the cursor up to the sub-menu line with the [↑] the first graph on the list will be selected (it was the last one backlit). **Home** returns to the sub-menu line without selecting a different graph.

4. OTHER KEYS

Confg accesses the sub-system configuration parameters. These parameters change the behavior of the sub-system. They are not preserved when you logout—values revert to the default settings when you reboot.



```
                          PGRAPH Flags
________________________________________________________________

<S> Show drawing process     <H> Hide drawing process

<I> Initialize formats and data

<J> No color mixing  <4> 4-color mix   <8> 8-color mix

<L> change Language for date text

<P> number of drawing Passes is 1


<Compose>  returns to main menu

<Config>   displays system Configuration functions

<Text>     turns all slide text off

           Press key for desired function
```

Menu 24: PGraph Flags

S	`Show the drawing process` while composing the slide. It is nice to watch the slide while it is being constructed and it is informative to see the order in which objects are drawn. However, for reasons buried in the hardware and the design of this subsystem (CPU-video contention), slides are composed 50% faster when the drawing process is hidden. Graphics draws slides pretty quickly, but if time is really important, type **H.**
H	`Hide the drawing process.`

I	Initializes formats and data. Returns Graphics to default settings.
J	Draws anti-aliased diagonal and curved lines. This results in smooth lines, but uses on-screen colors. (A lot of colors are used up in pie charts or if diagonal lines cross grid lines). You can control the level of anti-aliasing. Type **J** for no anti-aliasing. This may create acceptable bar and column graphs, but will almost certainly give unacceptable pie charts. Select two levels of anti-aliasing—use 4 or 8 colors for every color transition. You'll find that 4 color anti-aliasing is perfectly acceptable for all objects. The anti-aliasing level is global—all objects on the slide are drawn the same way.
L	changes date formatting language. There is one set of date text active at any one time. With the cursor on L, the `Language selected` field, **Next** or **Prev** selects a starting set of text.
P	numbers of drawing passes is 1 with a range from 1 through 9.

To edit, move the cursor to any individual entry, and type.

Text	turns all slide text off.
Confg	accesses the 20-K configuration menu.
Compose	leaves the PGRAPH configuration menu. Any change you make is saved (logged out) when you press **Compose.**

Dir	displays the contents of the selected disk.
Misc	activates the magnify function in the Presentation Graphics Subsystem.

To use the sequencer, first exit Graphics. The sequencer reads slides in the character generator. They take longer to read than backgrounds.

Seq-Play

H `Grow setup` grows the next slide. The sequencer reads the slide and displays a starting position for growing bars or columns.

I `Grow bars` grows the bars. Grow bars one after another.

Example:

```
                     :
          H          :Grow setup
Secs  10  W          :Scanwipe       6     slide
Secs  1   I          :Grow bars 2
```

This sequences sets up to grow bars from the slide `slide`, scanwipes at speed six from whatever is on-air to the slide start position, and grows each bar at speed 2 with a 1 second delay between bars.

If the next read does not read a slide, the sequencer does not grow bars and ignores the next Effect I. Effects H and I are active in the sequencer only and do not appear on the Effects menu.

5. RECORDING AND READING

5.1 Record

Record slides, graphs and data point lists on the disk. They can then be read back whenever you want them. The wise operator builds a *chart-book*—graphs and slides already formed and colored that can be recalled from the disk for professional-looking results. Press **Record** at any time to record data on the disk. Graphics prompts for a name and asks you to signify which of the three data categories to record:

CATEGORY	DESCRIPTION
Record	
`SLIDE`	Contains all necessary data to rebuild the entire slide. This includes the slide, the selectors, the placement of each graph, the graphs themselves and the data points for each graph. Record a slide to rebuild the screen as it currently appears.
`GRAPH`	The selected graph (identified by the outline box and the title line), and the data points for that graph. Record a graph to display it, perhaps with a different size or position, on another slide.
`DATA`	The data points currently used for the selected graph. Record data to save it for further updating. It will come in handy when the time comes for next month's charts.

Pick a name you can remember.

5.2 Read

There are five ways to read back information. Press **Read** or **Alt Read**. The table below describes what happens when you read back recorded information.

	CATEGORY	DESCRIPTION
Read	`SLIDE`	Erases the current slide and replaces it with slide, graph(s) and data point(s) previously recorded.
Alt Read	`SLIDE`	Preserves the current graphs and their data points. Graphics positions the graphs on the screen the way they were positioned on the recorded slide.
Record	`GRAPH`	Replaces the selected graph and its data points with the graph that was recorded on the disk.
ALT Record	`GRAPH`	Replaces the selected graph with the graph recorded on the disk. The data points are not replaced. Use **Alt Read** to see *what if* the data currently being plotted were plotted in a different style or with different colors.
Read	`DATA`	Replaces the data points for the selected graph with the recorded ones.

Presentation Graphics Primer

May 10, 1990

Software Version 2.0

Dubner Computer Systems

6 Forest Avenue
Paramus, NJ 07652

A Grass Valley Group Company

1. INTRODUCTION

The manual tells you all you'll ever need to know about Presentation Graphics. This primer tells you how to use the information. The first section duplicates several graphs already created on the distribution disk. The second section analyzes several graphs.

The Primer's format is simple. Explanations, commands, apologies, opinions, warnings, etc., are in the right hand column. Step-by-step instructions follow a command ending with a colon, e.g., ***Create a slide***: The left hand column, except for headings, has something for you to do. Bold-faced words in a large font are keystrokes for you to press, for example, **Enter**. `UPPER-CASE WORDS` are destinations. Move the cursor to those locations, with the cursor arrows or press **Home**, etc. Type bold-faced **numbers** and **letters.**

1.1 Configure for Anti-aliased Slides/Backgrounds

Many of our best messages are made with anti-aliased fonts and pictures. We've scaled the Master font, "Swiss 742 Bold," in two sizes to use with the Primer. These are fonts 9012, and 9018. Fonts, especially the small ones, come out so much nicer when they are anti-aliased. To see if you are configured for anti-aliased fonts and pictures, go into Graphics. Press

Graph	
Confg	If `Show drawing process` and `4-color mix` are highlighted, save this configuration as is on the disk.
	If they aren't highlighted, Type
S	`Show drawing process`
	Then type
4	`4-color mix`

Return to the character generator and log out:

Quit Quit	returns to the character generator
Confg Y S	logs out the configuration

1.2 Getting Started

Graphics creates eight styles of graphs. Here they are:

Graph	(Older keyboards, use **Misc P**). When you first enter Graphics, Presentation Graphics displays the eight styles of graphs. The default graph remains on your color monitor. The messages, "graphs1, graphs2" and "graphs3" illustrate the eight basic graphs. These graphs contain the same four data points: 100, 200, 300, 400, presented in the order: 100, 400, 200, 300. We'll duplicate these graphs, step by step.
Read graphs1 Enter **Read graphs2 Enter** **Read graphs3 Enter**	

Return to the default slide:

Confg I Y	Move the cursor to (Later on we'll omit the instruction, "Move the cursor to.")
`2-GRAPH`	Then
`[↓][←]` to	
`STYLE`	The status monitor lists the eight graphs' styles. `Column` is underlined. Column is the selected graph and the one displayed on the screen.

[↓] [←]	to
`BAR`	Wait until the new graph is drawn. Move the cursor to each of the seven other graphs.
[→]	That's all there is to it! Well, almost.

Presentation Graphics is based on these simple graphs. We'll show you how to enter data, create sophisticated multiple graphs and save your work to use in the character generator.

2. OPERATING GRAPHICS

Return to the default slide:

Confg I Y The default setting has the cursor on

`1-SLIDE` `with`

`SIZE` underlined. The back-lit area on the status monitor describes the area within the flashing lines on the color monitor.

Presentation Graphics is ready to alter the slide's size. But first, a discussion of operating procedure.

2.1 Procedure

Move the cursor or type a number:

3, 2 to reach each of the seven items on the main menu line. Each selected item is underlined.

The next line, or the "sub-menu" line responds to the cursor arrows or **Alt #**. With the cursor on the "sub-menu" line,

Alt 3
Alt 1 In the control areas below the sub-menu, the upper case letter of the field accesses that field quickly. For example, to access `Draw box` type

D `Draw box`
H `Height`
X `X org` (x origin)

Try a few more. ***Move the cursor to the Text field:***

T	`display Text`
Z	`horiZ`
V	`Vert`
L	`Label`

Or use the cursor arrows to get around the control areas. Use the cursor arrows and letters to reach the various fields on the status monitor. The back-lit words and the accompanying underlines are the selected functions.

Home returns the cursor to the current main menu location.

Home a second time, returns the cursor to

`1-SLIDE` (the first position on the menu).

[→][←][↑][↓] move in the expected directions and wrap around. We won't give the instruction, **Home**, etc., but we'll indicate the destination. When you encounter e.g., `2-GRAPH` in the left hand column in the Primer, the fastest way to get there is to press **Home** (gets you to the main menu), then type the number **2**.

Now that you know how to get around, we're ready to begin. We'll start with the original default slide.

Display the default slide:

Confg I Y

2.2 Edit a Slide

Create a label:

Sel 1 Font 111, "Cooper Bold 24" is assigned to **Sel 1.** See the right-hand bottom of the status monitor.

Presentation Graphics selector assignments can not be logged out (in Presentation Graphics mode). You can log them out in the Character Generator.

Presentation Graphics selector assignments are made from the previously recalled slide, in this case, Graphs3.

L **Enter**	`Label` ->**Slide 1**
	Display the label ON-AIR:
T	`display Text` ->**Yes**
Next and **Prev**	toggles between yes and no. Try it.

2.3 Record a Slide

Rec personal Enter

If the message "personal" already exists, re-record it.

"Pin" the text to the right, center, left, top, or bottom. There are nine pin locations (1 through 9). These correspond to the location of the numbers in the numeric keypad (the counter) on the right side of the keyboard. For instance, pin position "2" is the center of the bottom of the box, "5" is the center of the box, and "9" is the top right corner.

P	`Pin` ->**5**
Text	provides an ON-AIR text cursor to move the text around manually to the accuracy of a pixel or a line.
[→][←][↑][↓]	***Move the text manually:***

Bkgd provides an ON-AIR box cursor to move the enclosed area.

[↓] The new position is accepted when you press

Enter or
Compose

Bkgd
Shift Char
[→][←][↑][↓]

alters the size of the selected object manually. The new size is accepted when you press

Enter or
Compose

Now that you've made a mess, recall "personal."

Read personal Enter

2.4 Edit a Graph

Return to the main menu-line:

Home
`2-GRAPH`

Oops! I said I wouldn't tell you how to get to the main menu. Well, next time you can get there on your own.

`SIZE` The blinking box outlines the selected graph.

Alter the Size:

D `Draw box` ->**Yes**
W `Width` ->**45** [↓] or **Enter**
`Height` ->**40** [↓] or **Enter**
`X org` ->**50** [↓] or **Enter**
`Y org` ->**12** [↓] or **Enter**

Bkgd alters the size and placement manually.

Record the slide:

Rec personal1 Enter

The `Y BIG` Grid lines on graphs1 are spaced closer than our grid lines.

Home	to the menu-line.
6	selects `6-GRIDS`
`Y-BIG`	selects the `Y-BIG` grid lines.

Alter the grid spacing:

d	`Draw box`	->**Yes**
s	`Spacing`	->**50**
[→][←][↑][↓] or **Enter**	enters the new parameter.	

We'll explain more about grids and ticks below.

2.5 Change Colors of a Selected Item

Change the color of the `Y Big` grid:

Pal	***Move the cursor to a pleasing color:***
Enter	keeps the new color.

2.6 Display Data: Values, Text, Percentage

In the `3-CHART` sub-menu, the Text display of
`foreground` = data values
`edge` = data text
`drop shadow` = data percentages

Display the data values:

`3-CHART`
`FOREGROUND`

T	`display Text`	->**Yes**

	Change to a smaller font:
Sel 5	Anti-aliased font 9012.
	Move the data values text up a smidgen:
V **Enter**	`Vert` **->10**

2.7 Record the Graph

Rec personal1 Graph

2.8 Grow Bars

`3-CHART` `GROW`	`Press <Y> to grow bars on trigger`
Y	`Enter speed to grow bars:`
8	`Press <ENTER>  or speed for next bar:` `Growing at speed 8`
	`Press another speed or <ENTER>, to grow bars`
8 **Enter**	Continue to grow bars. Vary the speed.
	`To grow bars all at once, but at a specific speed, press <ENTER> or "N"`

2.9 Data

2-GRAPH
DATA
[↓] Value

Pt 5: 4 **500**
Pt 6: 5 **75**

Record the Data:

Rec personal3 Bkgd

To resume duplicating graphs1, recall personal2:

Read personal2 Enter

Display the data text:

3-CHART
EDGE
T display Text ->**Yes**

Each field requires its own font assignment.

Change to a smaller font:

Sel 5

Display the Data percentage text:

DROP SHADOW display Text ->**Yes**

Sel 5 The fonts assigned to the selectors, all have white foregrounds. To change the selector colors, go to the Character Generator.

Quit
Pal ***Do your thing. Return to Graphics:***

Graph You're in the same place as when you left.

What a mess! We won't record the data text and the data percentage text. To continue with our project, recall

Read personal2 Enter

2.10 Change Colors of Individual Columns

`2-GRAPH` `DATA`	***Move the cursor to the first value:***
`Value 100`	represents the first data point (the first column).
Pal	Move the cursor to a pleasing color.
Enter or **Compose**	enters the color change.
Quit	from palette mode deletes the color entered from the data points.
	Move the cursor to the next value. Continue to change all the column colors.
Rec personal4 Enter	

2.11 Grids and Ticks

	See Definitions and Composition Rules in the Introduction of the User's Manual.
	Each graph contains axes, grid lines and tick marks. Play the sequence recorded on the Distribution disk for an illustration.
	Exit Graphics mode:
Quit	
Seq Play Read gridseq Enter Enter	
Compose	exits Sequence-Play.
	Reenter Graphics:
Graph	We resume where we left off. We're in the same menu as when we left Graphics Mode.

	Alter ticks:	
`7-TICKS`		
`Y-BIG`	`Draw box` and `display Text` describe the `Y-BIG` ticks.	
	Display tick's text, just to see what happens. Then remove the text display of the `Y-BIG` ticks:	
t	`display Text` `display Text`	->**Yes** ->**No**
	Remove the Y-BIG ticks from the display:	
d	`Draw box`	->**No**

2.12 Label a Graph

`2-GRAPH`		
`SIZE`		
Sel 4	Anti-aliased Font 9018, Swiss 742 18	
t	`Display Text`	->**Yes**
l	`Label`	->**column**
Enter		
	Adjust the text position manually:	
Text [↑]		
Enter		
Rec personal5 Enter		

2.13 Pie Chart

`1-SLIDE`	**Home Home** gets you there fast.
	Add the pie:
`ADD` **P**	

Move this pie graph to the upper right hand corner:

Bkgd [↑] to an appropriate position.

Enter The status monitor prompts:

```
Change all other graphs of this size?
```

No. We only want to move the pie, not the column graph.

N

Rec personal6 Enter

records the slide with the two graphs.

The blinking box indicates that the Pie is selected. The top row of the status monitor announces,

```
Edit graph size for Pie graph 2.
```

Any editing you do, including deleting or adding a graph affects this selected graph.

When you read in a previously recorded graph, for example, personal2, the newly read graph replaces the selected graph.

When you recall a slide with multiple graphs, the graph first in the drawing order is selected. Use **Alt Next** or **Alt Prev** to select the other graphs.

Try it, then recall the slide, personal6.

Alt Next reselects Pie graph 2.

Display the data percentages of the pie chart:

We've assigned anti-aliased font 9012 to Selector 5. To assign another font to a selector, quit Graphics, press **Font S**, select your font, then reenter Graphics.

`3-CHART`
`DROP SHADOW`
Sel 5

T	`display Text`	->**Yes**

Rec personal7 Enter

Label the pie chart:

2-GRAPH
SIZE
Sel 4 Font 9018

T	`display Text`	->**Yes**
L	`Label`	->**pie**

Give the pie chart a drop shadow:

Home
`3-CHART`
`DROP SHADOW`

D	`Draw box`	->**Yes**

Record the pie chart:

Rec personal8 Graph

2.14 Fill Chart

`1-SLIDE`
`ADD`
F

Type the capitalized letter of the chart style:

Move Fill graph 3 to an appropriate location and alter its size:

Bkgd	provides the ON-AIR cursor. Use the counter keys, the **Shift Char** and cursor keys to relocate the Fill chart.	
Enter N	accepts the changes.	
	Record three graphs as a slide:	
Rec personal9 Enter		
	Draw a background for Fill graph 3:	
`2-GRAPH`		
`SIZE`		
D	`Draw box`	->**Yes**
	Draw the Y and X axes:	
Home		
`5-AXES`		
`X-AXIS`	`Draw box`	->**Yes**
`Y-AXIS`	`Draw box`	->**Yes**
	Display the text for the `Y-BIG` ticks:	
Home		
`7-TICKS`		
`Y-BIG`		
Sel 5	Font 9012	
T	`display Text`	->**Yes**
	Space the ticks at 80:	
D	`Draw box`	->**No**
	`Width`	
	`Height`	
	`Y org`	
	`X org`	
	`Spacing`	->**80**
Enter		
Rec personal10 Enter		
	These charts are scaled from 0 to 400.	

2.15 Scaling

Home

`5-AXES`

`SCALING` Change the range. Experiment with the different number of tick marks relative to the graph's scaling.

Read personal10 Enter

Alt Prev selects Fill graph 3.

***Change the color of the foreground of Fill graph3*:**

`3-CHART`

`FOREGROUND`

Pal Do your thing.

Enter

Give the Fill chart a drop shadow:

`DROP SHADOW`

D `Draw box` ->**Yes**

Label the Fill Chart:

`2-GRAPH`

`SIZE`

Sel 5 Font 9018

T `display Text` ->**Yes**

L `Label` ->**fill**

Record three graphs in a slide:

Rec personal11 Enter

2.16 Convert a Slide to Text/Background Messages

Compose

The status monitor announces

```
Building  Chart  Background/Converting
Chart Text
```

and reenters the Character Generator. This is what Presentation Graphics is all about. You've created messages which can now be used (and edited) in the Character Generator.

I didn't notice this before, but the whole picture is too low on the screen.

Reenter Graphics and raise the whole slide:

Graph

```
1-SLIDE
SIZE        Y org            ->10.10
```

That's better. Now the picture is within the safe-title lines.

Re-record personal11:

Rec personal11 Enter Y

Build the chart background and convert the text:

Compose

Record the background message first, then record the text message:

Rec personal12 Bkgd

records the background.

Rec personal13 Enter

records the text. "personal13" is a duplication of "graphstext1." The slide message "graphs1" is the same as "personal11."

Read graphstext2 Enter

This message also has three graphs: Line, Scatter, and Column Stack. We'll create this slide out of Slide 1.

Graph	reenters Presentation Graphics.
`1-SLIDE SIZE`	***Create a new title for Slide 2:***
t	`display Text` ->**Yes**
l	`Label` ->**Slide 2**
Rec personal20 Enter	

2.17 Scatter Chart

`2-GRAPH STYLE`	***Convert*** `Column graph 1` ***to a*** `Scatter chart:`
Alt Next	selects `Column graph 1.`
S	Oops! ***Select Font 9012 for the data value text:***
`3-CHART FOREGROUND`	
Sel 5	`Draw box` ->**Yes**
	`Char ->y` `Sel ->6 <9002>+ BULLET 10 -P`
	Font 9002+ BULLET 10 is assigned to **Sel 6**. To reach this control, press **S** or [↓] through the control boxes. [↓] wraps around and up. It's simpler to press the letter:
S	controls the scatter chart font.
Next / Prev	changes the selector.
Rec personal21 Graph	

Of course it isn't necessary to record all these graphs. I do it so that when (not if) I make a mistake or change my mind or the power fails, I don't have to recreate the whole slide. Once I create the final slide, background message and text message, I delete all the preceding slides and graphs. You could save the data messages for use with different graphs at another time.

Label the Scatter chart:

`2-GRAPH` `SIZE`	
Sel 4	Font 9018
I	`Label` ->**scatter**
Enter	
Rec personal22 Enter	

2.18 Multiple Graphs on a Slide

The top row of the status monitor advises which graph is selected.

Select another graph:

`1-SLIDE` `ORDER`	Lists the graphs on this slide. Move the cursor to the target graph, Pie graph 2.
Home	selects that graph.
`2-GRAPH` `SIZE`	The flashing cursor encloses the selected graph. The top row on the status monitor tells you where you are.
Alt Next and **Alt Prev**	select graphs from any location on the menus (without entering `1-SLIDE ORDER`).

2.19 Line Chart

Convert Pie graph 2 to a Line graph:

`2-GRAPH`
`STYLE L`

Don't display the data percentages:

`3-CHART`
`DROP-SHADOW`
T `display Text` ->**No**

Create a drop shadow for the line chart:

d `Draw box` ->**Yes**

Rec personal23 Enter

Display the text for the `Y axis scaling`:

Home
`6-GRIDS`
`Y-BIG`
Sel 5 Anti-aliased font 9012.

D `Draw box` ->**No**
S `Spacing` ->**80**
T `display Text` ->**Yes**

Voila!!!

Display the `Y-LITTLE` grid lines.

`Y-LITTLE`
D `Draw box` ->**Yes**
S `Spacing` ->**40**

Change the color of the `Y-LITTLE` grid lines.

Pal I chose to make them a dark green. Don't make them the exact same color as the drop shadow. You'll get funny empty spaces.

Shift Char [↓]	moves the palette out of the way.
Enter	enters the color change.
	Label the graph:
`2-GRAPH` `SIZE`	
`Sel 4`	Anti-aliased Font 9018, Swiss 742 18
L **Enter**	`Label` ->**line**
	Record this slide:
Rec personal24 Enter	
	Add text data to the line chart: Add a column chart *in front of* the line chart:

`1-SLIDE`
`ADD`
`COLUMN`
Enter	

	Add the text data:
`2-GRAPH` `DATA`	
`POINT`	Type text for the four points.
`3-CHART`	
`FOREGROUND`	`Draw foreground` ->**No**
`EDGE`	`Draw Edge` ->**Yes**
	***Pin the text at 8*:** (the top of the unseen column chart)
`P`	`Pin` ->**8**
	Recall personal24 and continue.

2.20 Column Stack Chart

	Convert Fill graph 3 to a Column stack chart:
Alt Next	selects the Fill graph3.

2-GRAPH STYLE O	creates a column stack chart.	
	Rename the graph:	
Home SIZE **l** **Enter**	Label	->**column stack**
	Pin the text at 5:	
p	Pin	->**5**
	Remove the Y Big tick text display:	
Home 7-TICKS Y-BIG **T**	display Text	->**No**

2.21 Display Data Percentages

Home 3-CHART DROP-SHADOW **Sel 5**	Anti-aliased Font 9012.	
T	display Text	->**Yes**

Relocate the words, "column stack" manually:

Home
2-GRAPH
SIZE
Text [↓]
Enter

Display the Y-BIG grid lines:

Home
6-GRIDS
Y-BIG
D Draw box ->**Yes**
S Spacing ->**100**

Change the color of the Y-BIG grid lines:

Pal Do your thing.
Enter

Record the slide:

Rec personal25 Enter

Compose exits Graphics mode, builds the chart background and converts the text.

Rec personal26 Bkgd
Rec personal27 Enter

"Graphstext3" has two graphs: a bar stack displayed with data percentages and a bar with the data values. We'll create them on Slide 3 from the graphs on Slide 2. In this exercise, you'll also learn how to delete a graph.

Graph The slide, "personal25" is still on the screen, unless you've done something else. If you have, recall "personal25."

Read personal25 Enter

The column stack graph displays the data percentages and the scatter graph displays the data values. We'll convert these graphs.

2.22 Delete a Graph

	Delete Line graph 2:
1-SLIDE	
ORDER	
[↓]	***Move the cursor to the target graph, in this case, Line graph 2.***
Alt Del	`Press 'Y' to delete graph 2.`
Y	deletes the line graph.
	Label this slide:
1-SLIDE	
SIZE	
Sel 1	Font 111
L	`Label` ->**Slide 3**
Enter	

Rec personal30 Enter

2.23 Bar Chart

	Convert Scatter graph 1 to Bar graph:
2-GRAPH	
STYLE	
B	Ugly!!! We'll fix it. Have no fear.
	But first, label the graph.
	Then move the text down, just a smidgen:
Text [↓]	
	Change the font for the data values text:
3-CHART	
FOREGROUND	
Sel 5	

Remove the grid lines:

6-GRIDS	To determine which grid is drawn, move the cursor along the third row of the status monitor. The cursor on the color monitor flashes the selected parameter.	
X-BIG		
D	Draw box	->**No**

Draw the foreground, the edge and the drop *shadow:*

3-CHART		
FOREGROUND	Draw box	->**Yes**
EDGE	Draw box	->**Yes**
DROP SHADOW	Draw box	->**Yes**

Rec personal31 Enter

Move and alter both graphs to fit the bottom and top halves of the slide:

2-GRAPH
SIZE
Bkgd 7
Shift Char [←]
Enter

Select the column stack graph:

Alt Next	Move and reposition this graph on the top half of the slide.

Rec personal32 Enter

2.24 Bar Stack Chart

Convert cOl stack graph 2 to a bar stack graph:

2-GRAPH
STYLE

A	*Ugh!!*

	Change the data percentages font:	
3-CHART		
DROP SHADOW	display Text	->**Yes**
Sel 5	That's better.	
	Change the label:	
2-GRAPH SIZE		
Sel 4	Font 9018	
L	Label	->**bar stack**
Enter		
	Relocate the text:	
Text [↓] **Enter**		
	Remove the grid lines from the display:	
6-GRIDS X-BIG		
D	Draw box	->**No**
	Remove the axes:	
5-AXES X-AXIS		
D	Draw box	->**No**
Y-AXIS		
D	Draw box	->**No**
	Remove the background:	
2-GRAPH SIZE		
D	Draw box	->**No**
	Remove the axes, the grid lines and the background of Bar graph 1.	
Rec personal33 Enter		

Convert the slide to a background and text message:

Compose

Rec personal34 Bkgd
Rec personal35 Enter

You've duplicated three complicated slides. In the next section, you'll analyze even more complicated slides and add your own data.

3. ANALYZING SLIDES

In this section we analyze slides created by our programmer/artist. We follow the steps she took.

Read canadatext Enter

This message contains two overlapping graphs, a date sequence, data values text and legends for each graph.

3.1 Overlapping Graphs

Graph

Read canada Enter

"Walk" through the slide:

`1-SLIDE`

`SIZE` — The flashing cursor encloses the box of the slide (the box is drawn); "Canadian Farm Bankruptcies" is the (displayed) text of the slide label.

`ORDER` — The slide has two bar graphs. To visualize the individual graphs, draw their boxes:

`2-GRAPH`

`SIZE`

D — `Draw box` ->**Yes**

Alt Next — selects Bar Graph 2.

`Draw box` ->**Yes**

What happened? Graphics draws graph 2 last. Its box covers the graph drawn first.

3.2 Drawing Order

Read dow Enter	
`1-SLIDE` `ORDER`	These four graphs are drawn in this order to display the little Y and little X grid lines of Bar graph 2 behind the Fill graph 3.
	Change the drawing order: Draw Fill graph3 first:
[↓][↓][↓]	places the cursor on Fill graph 3, then
Kern/Xchg [↑][↑]	After a small pause, Fill graph 1 draws first. The second bar graph drawn covers the first graph drawn.
	Replace the present slide with canada:
Read canada Enter	
`2-GRAPH` `ORDER`	Draw each element of each graph. The status monitor names each element; the flashing cursor outlines each element. Place the cursor under the Draw column.
Next	toggles `Draw ->yes` and `Draw ->no`

3.3 Tick Marks and Grids

Change all the Draw No parameters to Draw Yes. You'll make a terrible mess, but it'll be an excellent demonstration of tick marks and grid lines.

Undraw the X axis to see the X tick marks. Are they too tiny? Go to the tick marks control box.

Move the cursor onto

`Big X tick marks` `then`

Sel Disp moves to the control box of the selected parameter.

Change the size of the X tick marks:

W `Width` ->**2**

H `Height` ->**4**

`2-GRAPH`

`ORDER` Continue to change the parameters. When you don't see a dramatic change, go to the control box and increase the parameters. For example, change the spacing of the Big Y Grid lines to 120 and the Little Y Grid lines to 15.

Notice what happens when you alter the drop shadow, foreground and edge of Bar graph 1. With no foreground and no drop shadow, the chart becomes invisible. The artist chose not to draw the drop shadow of Bar graph 2.

Replace the original slide:

Read canada Enter

3.4 Data

`2-GRAPH`

`DATA` Bar graph 1 has nine points. Date is the list type identifier. Full year is the title of list #1 (the legend of the graph).

Alt Next ***Edit graph data for Bar graph 2:***

`DATA` shows the data menu for Bar Graph 2. The title of list #2 is Through June.

Bar graph 2 has nine points, but only two points have a value above 0.

Return to Bar graph 1:

Alt Next

`DATA`

Edit graph data for Bar graph 1:

Display dates:

`DATE`

The list type of Bar Graph 1 is Date. The status monitor prompts

```
Select one:      N-Num      (number)
                 T-Text     (text)
                 D-Date     (date)
                 S-Seq      (sequence)
```

Our bar graph list type is `Date.`

d

```
Starting date    ->01/01/1979
Date interval    ->1
```

The date interval on our slide is yearly.

```
1: Yearly
2: Quarterly
3: Monthly
4: Weekly
5: Daily
```

Enter Enter or [↓][↓]

The slide displays the date in the format:

`apostrophe-decade ('79).`

```
Date display format   ->'11
```

Experiment. Change the starting date. Presentation Graphics is a little fussy about starting dates. Enter the month number/day number/the year number.

Change the date display format:

```
Date display format   ->10
```

[↓]	To display the first weekday of the year, an apostrophe and the decade, use the following format:
	`Date display format` **->6'11**
Enter	

3.5 Sort Graph Data

Tab or [←]	to
`SORT`	This graph is `3-Text Up.`
	Experiment with
1,2,3,4	

3.6 Numeric Sequence Graph

Read numeric Enter

`2-GRAPH`	
`ORDER`	Numeric has three sets of numbers (see Text column):

```
Big Y grid lines
the data values
the data text
```

`Foreground`	displays data values.
`Edge`	displays data text.

3.7 Chart of a Graph

Read canada Enter

```
3-CHART
FOREGROUND
```

D	`Draw box`	->**No**
T	`Draw Text`	->**No**

```
DROP SHADOW
```

D	`Draw box`	->**No**

3.8 The Chart Legend

`4-LEGEND`

Continue to toggle the responses in the control areas. Use **Bkgd** to move the legend box and **Text** to move the legend text.

TRICKS OF THE TRADE: If you are paying close attention, you'll notice something very strange about this legend. What should be a legend is not. It is an `X BIG` grid mark. Go to the grids control box. The artist chose to make a grid because Graphics draws legends with the same parameters as the bars. Graph 1 bars have a drop shadow; graph 2 bars do not. The artist drew grids rather than have one legend with a drop shadow and one without.

3.9 Data of a Pie Graph

Read "take":

Read take Enter

```
1-SLIDE
SIZE
```

D	`Draw box`	->**No**
T	`display Text`	->**No**

`2-GRAPH` `SIZE`	
D	`Draw box` ->**No**
T	`display Text` ->**No**
`2-GRAPH` `ORDER`	Continue to toggle the responses in the control boxes.
	Display the data percentages text without the drop-shadow. The data values text requires the foreground; the data text requires the edge.
`2-GRAPH` `DATA`	Pie graph 1 has six points. The list type is "Text." The label of the graph is `DEFAULT DATA`. (It wasn't named.) `C` on the right hand column indicates changes were made in the palette to each point.
	Position pie text:
	Move the cursor to a point, e.g., "Canada."
Text	enters the pie text positioning menu.
Tab or **Alt cursor-arrow**	**to**
	`Percentages`
	`Draw Y` `X org` ->**15**
Enter	Graphics draws the data percentages for point #1, Canada.
	Continue to toggle the responses in the pie text positioning menu.

Recall another multi-graph slide:

Read rise Enter This slide contains four graphs.

2-GRAPH
SIZE

Alt Next to see all four graphs outlined on the color monitor. End at

```
Edit graph size for Column graph 1.
```

`"The Rise of Public Partnerships"` could have been the label of the slide, but the artist wanted the text to have its own background. She made a wide (98% of the slide) single column graph.

Change the width of the column:

2-GRAPH
SIZE

D

```
Draw box          ->Yes
Width             ->50.00
```

2-GRAPH
ORDER

for Column graph 1. The only other item drawn is the column drop shadow.

Since the columns of graphs 3 and 4 do not have drop shadows, the legends draw without a drop shadow. Graph 2 is a background for the legends of graphs 3 and 4.

Delete graph 2:

1-SLIDE
ORDER

Put the cursor on the `legend background` column and

Alt Del
Y

```
Hit 'Y' to delete graph 2.
```

Alt Next Selects Column graph 2.

`2-GRAPH`	
`SIZE`	The cursor outlines Column graph 2. The red and blue columns do not overlap because the X origin of graphs 2 and 3 are not the same. Go to the control box in
`3-CHART`	
`FOREGROUND`	The X origin for graph 2 is 0.00%, and the X origin for graph 3 is 5.00%.
Read axwipe Enter	
	This interesting slide has four fill graphs. "axtick" is the same slide but does not display all the charts.
Read axtick Enter	
`1-GRAPH`	
`SIZE`	`Fill graph 1` is the background for the slide label, "AXIS SCALING, TICK MARKS." The interesting textured look is created with the Y little grid lines. See
`2-GRAPH`	
`ORDER`	`Little Y grid lines` ->**Yes**
Alt Next	selects Fill graph 2.
	Draw the fill:
`3-CHART`	
`FOREGROUND`	`Draw box` ->**Yes**
`DROP SHADOW`	`Draw box` ->**Yes**

3.10 Sequence Graph

`2-GRAPH`	
`DATA`	Fill graph 2 is a sequence graph with 12 points. Graphics does not display the text for the first and last points. In this graph, Graphics draws the values from 0.2 through 1.0.

`SEQ S`	The sequence starts at 0, and is incremented in steps of one. The display format "#.#" stands for "number, point, number."
`5-AXES`	
`SCALING`	The Y axis (Top and Bottom) ranges from 400 to 0. Change the scaling to 500 to 10.
	The X axis scaling (or domain), in this case, is determined by the point sequence: `number of points` (12) X `sequence step` (1) = 12. So, given the `sequence start` of 0, the domain is 0 to 11. Similarly, if the sequence step was 2, the domain would have been 0 to 22.
	Remove the foreground and the drop shadow from the display:
`3-CHART`	
`FOREGROUND`	`Draw box` ->**No**
`DROP SHADOW`	`Draw box` ->**No**
	Select Fill graph 3:
Alt Next	***Edit chart drop shadow for Fill graph 3:*** ***Display the drop shadow and the foreground:***
`3-CHART`	
`DROP SHADOW`	`Draw box` ->**Yes**
`FOREGROUND`	`Draw box` ->**Yes**
`2-GRAPH`	
`ORDER`	
	Move the cursor to each parameter:
`X axis`	The flashing cursor indicates the selected parameter. Note the placement of the X axis.
`Big X tick marks`	Note the placement of the big X tick marks.
	Go to the control box:
Sel Disp	Enters the `7-TICKS X BIG` menu. These ticks are placed below the chart.
	`Y org ->-23.76%.`

`2-GRAPH` `ORDER`	
`Big X grid lines`	Only the text of the big X grid lines is displayed.

3.11 Number Graph

`2-GRAPH` `DATA`	This is an 11 point `number` chart.
Alt Next	***Edit graph data for Fill graph 4.***

`2-GRAPH`
`DATA`
`POINT`
	Graph 4 is a date graph displaying the first letter of each month from January to October.

`DATE D`	
[↓][↓]	`Date display format   ->3`
	displays the data with the initial of the month. The artist chose not to display this data text.
	Display the data text:
`3-CHART`	
`EDGE`	`display Text` ->**Yes**
`FOREGROUND`	`Draw box` ->**Yes**

3.12 Point Text Data

Read "school:"

Read school Enter

`2-GRAPH` `DATA`	The list type is `Text`.

Change data values:

This slide will now seem very easy for you to make. Add a pretty background to "School Supply Sales:"

1-SLIDE
ADD C

Do not draw the chart foreground of Column graph4:

2-GRAPH
DATA

Change the values to zero:

[↓]

```
1: 0        0
2: 1        0
3: 2        0
```

Repeat to change all the points' values to zero. Of course you could also have gone to

3-CHART
FOREGROUND

Draw box ->**No**

but then you wouldn't have learned how to change the data values.

Move the graph and make it smaller so that it fits appropriately around "School Supply Sales:"

2-GRAPH
SIZE

Bkgd
Shift Char cursor-arrow
Enter n

Draw the box of the graph:

2-GRAPH
SIZE

Draw box ->**Yes**

Change the color:

Pal

Do your thing.

How to Use WordPerfect to Drive the Dubner Character Generators

August 2, 1990

1. INTRODUCTION

You can use WordPerfect to transfer text and commands to the 10-K, 20-K, 30-K and Graphics Factory. (From now on we'll say "Dubner" for any of the systems.) This technique requires a working knowledge of the Dubner and Wordperfect.

In addition to this User's Guide, we are enclosing a connector cable and a disk.

The disk contains a printer file entitled `Dubner.prs` and WordPerfect macros. The macros execute the following Dubner text composition functions:

Alt A	Plays K programs recorded with Alt-
Alt C	**Centr**
Alt E	**Erase-Text**
Alt G	Generates the text on the Dubner
Alt H	**Home**s the cursor
Alt K	**K Edit** or, if in K Edit, enters K keystroke mode
Alt L	**Newline**
Alt R	**Record**
Alt S	**Sel-Disp**
Alt T	**Text**

See Section 5, "WordPerfect Macros" for a complete description.

2. CONNECT A DUBNER PORT TO A PC PORT

10K-20K to PC RS-232 Cable

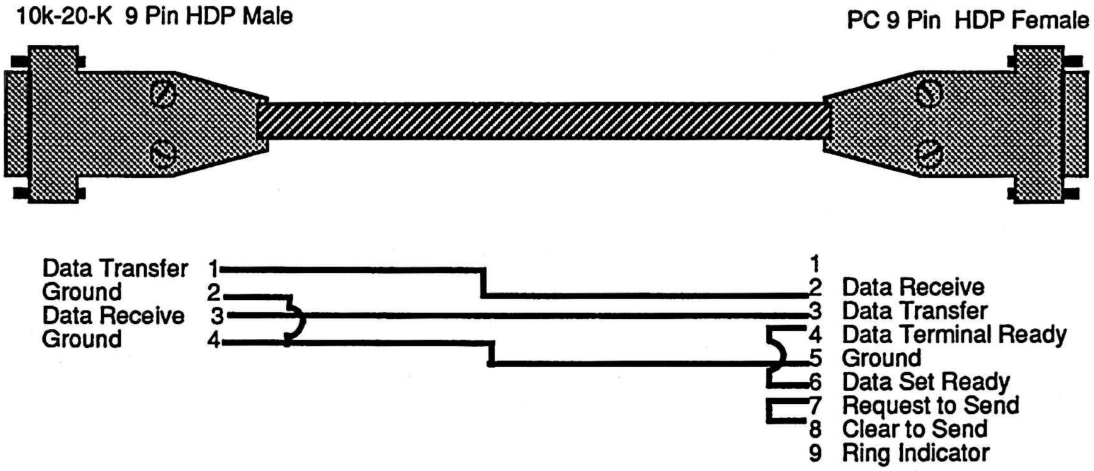

10k-20-K 9 Pin HDP Male
PC 9 Pin HDP Female
Data Transfer 1
Ground 2
Data Receive 3
Ground 4
1
2 Data Receive
3 Data Transfer
4 Data Terminal Ready
5 Ground
6 Data Set Ready
7 Request to Send
8 Clear to Send
9 Ring Indicator

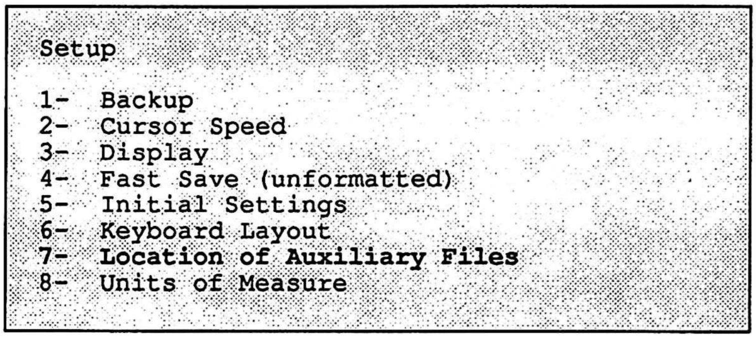
Figure 1. 20-K to PC RS-232 Cable

3. CONFIGURE WORDPERFECT

3.1 Set the Printer Parameters

The pertinent parameters are displayed in boldface:

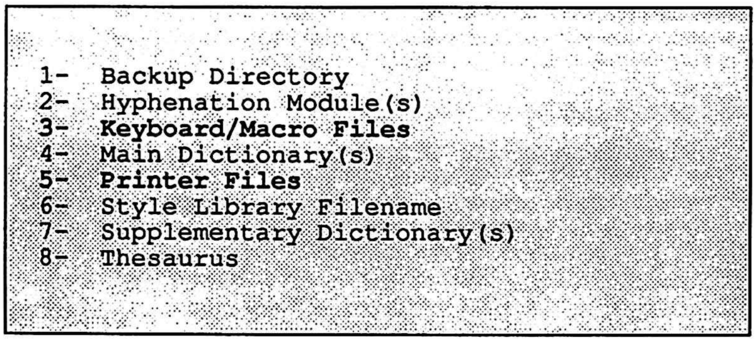
Shift F1 Enters the Setup menu:



Setup

1- Backup
2- Cursor Speed
3- Display
4- Fast Save (unformatted)
5- Initial Settings
6- Keyboard Layout
7- Location of Auxiliary Files
8- Units of Measure

7 Location of Auxiliary Files



1- Backup Directory
2- Hyphenation Module(s)
3- Keyboard/Macro Files
4- Main Dictionary(s)
5- Printer Files
6- Style Library Filename
7- Supplementary Dictionary(s)
8- Thesaurus

3 Keyboard/Macro Files. Type the letter of the drive you are using for the Macro Files. They have the extension .wpm.

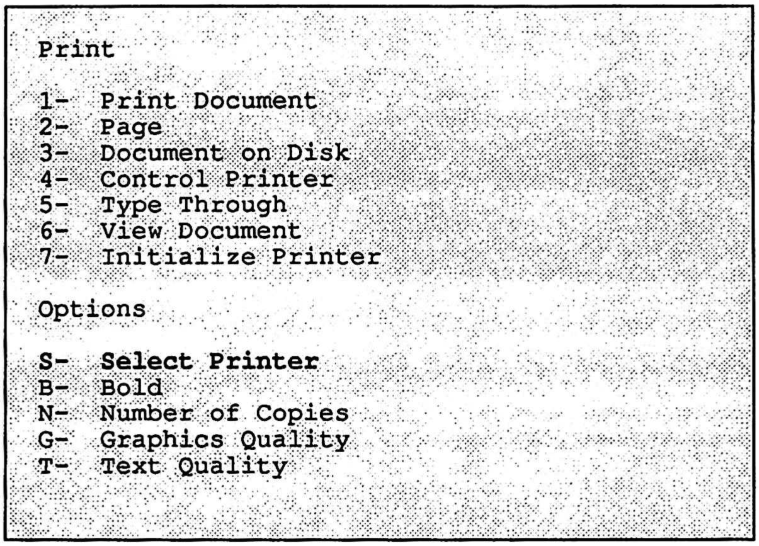
Enter

5 Printer Files. Type the letter of the drive you are using for the Dubner disk.

Enter Exits Setup.

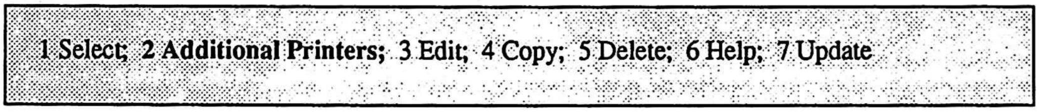
3.2 Select the Printer Options

Shift F7 Enters the Printer Options menu:



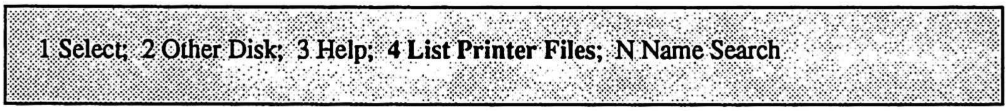
```
Print

1-  Print Document
2-  Page
3-  Document on Disk
4-  Control Printer
5-  Type Through
6-  View Document
7-  Initialize Printer

Options

S-  Select Printer
B-  Bold
N-  Number of Copies
G-  Graphics Quality
T-  Text Quality
```

S Select Printer



```
1 Select; 2 Additional Printers; 3 Edit; 4 Copy; 5 Delete; 6 Help; 7 Update
```

2 Select Printer: Additional Printers



```
1 Select; 2 Other Disk; 3 Help; 4 List Printer Files; N Name Search
```

4 Select the Dubner.PRS.

4. CONFIGURE THE DUBNER

Confg Enters the Configurations menu:

```
        Configurations Functions (page 1)
   ________________________________________________
   Y      sYstem configuration (login and logout)
   D      Display current configuration
   P      Port definition (set baud rate, usage,
          etc)
```

P Port Definition

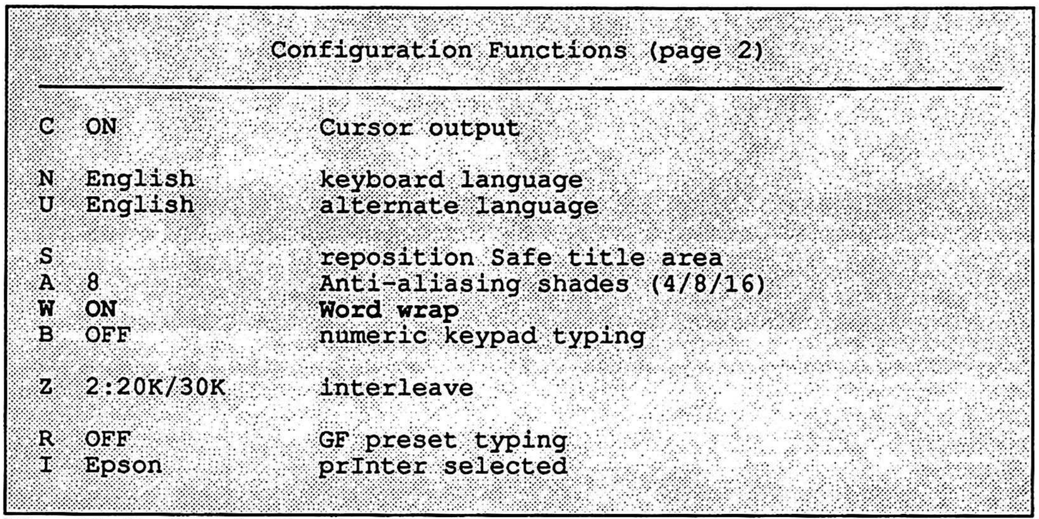
```
Port  Protocol  Baud  Bits  Parity  Stop  Handshake  Usage  User
                Rate                Bits
________________________________________________________________
C     RS-232    600    8    None     1    None       HOST   OFF
```

Use **Prev** and **Next** to define a port with these parameters. In our sample, we've defined Port C.

We chose 600 for the baud rate. This rate is slow enough for you to see the keystrokes as they go by. If you prefer, you can use a faster rate. Just be certain that the baud rate you select for the Dubner matches the rate you select for the printer.

Go to page 2 of the Configurations menu and turn Word Wrap off.

Confg
Spacebar Enters page 2 of the Configurations menu:



```
              Configuration Functions (page 2)
  ________________________________________________________________

  C  ON             Cursor output

  N  English        keyboard language
  U  English        alternate language

  S                 reposition Safe title area
  A  8              Anti-aliasing shades (4/8/16)
  W  ON             Word wrap
  B  OFF            numeric keypad typing

  Z  2:20K/30K      interleave

  R  OFF            GF preset typing
  I  Epson          prInter selected
```

Menu 25: Configuration Functions (Page 2)

W Turn Word wrap off. *NOTE:* Typeover must be on.

5. WORDPERFECT MACROS

We've assigned macros to WordPerfect **Alt** keys. The following is a description of the **Alt** key macros:

Alt Q	Enters Compose mode.
Alt E	Erase-Text.

We recommend that you always start a new message with **Alt Q** and **Alt E.**

Alt H	Home the cursor.
Alt L	Move the cursor to the next line.

The macros that follow require more than one keystroke to initiate the function. You will be prompted with a beep, then the program pauses while you type the appropriate letter(s). Press **Enter** to initiate the function.

We display the appropriate Dubner menu for each function.

5.1 Select a Selector

Alt S	Beep!
s1 Enter	The status monitor displays `<S1>` indicating Selector 1.

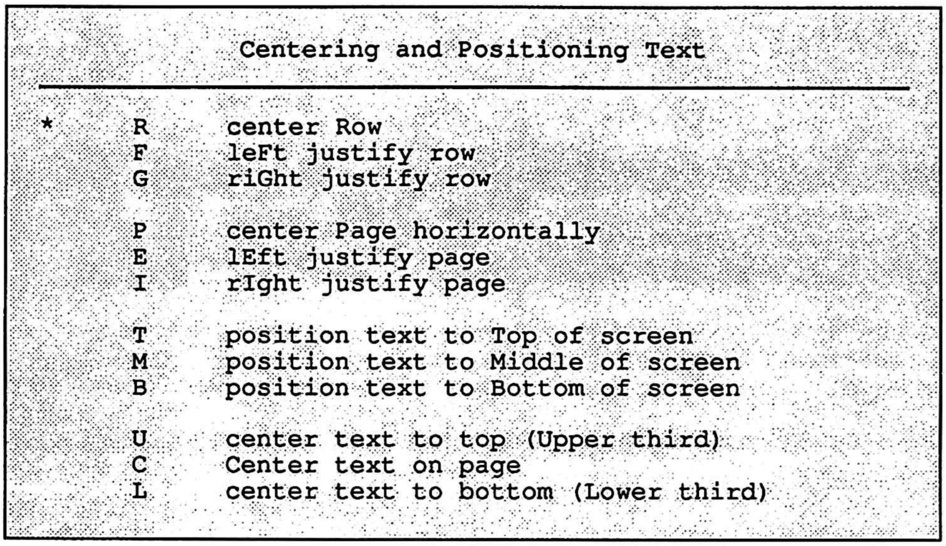
Alt S	Beep!
s2 Enter	The status monitor displays `<S2>` indicating Selector 2.

Alt S	Beep!
s3 Enter	The status monitor displays `<S3>` indicating Selector 3.

Macros are set up for all eight Selectors.

5.2 Center or Position Text

Alt C Beep!



```
             Centering and Positioning Text
 ____________________________________________________
 *      R     center Row
        F     leFt justify row
        G     riGht justify row

        P     center Page horizontally
        E     lEft justify page
        I     rIght justify page

        T     position text to Top of screen
        M     position text to Middle of screen
        B     position text to Bottom of screen

        U     center text to top (Upper third)
        C     Center text on page
        L     center text to bottom (Lower third)
```

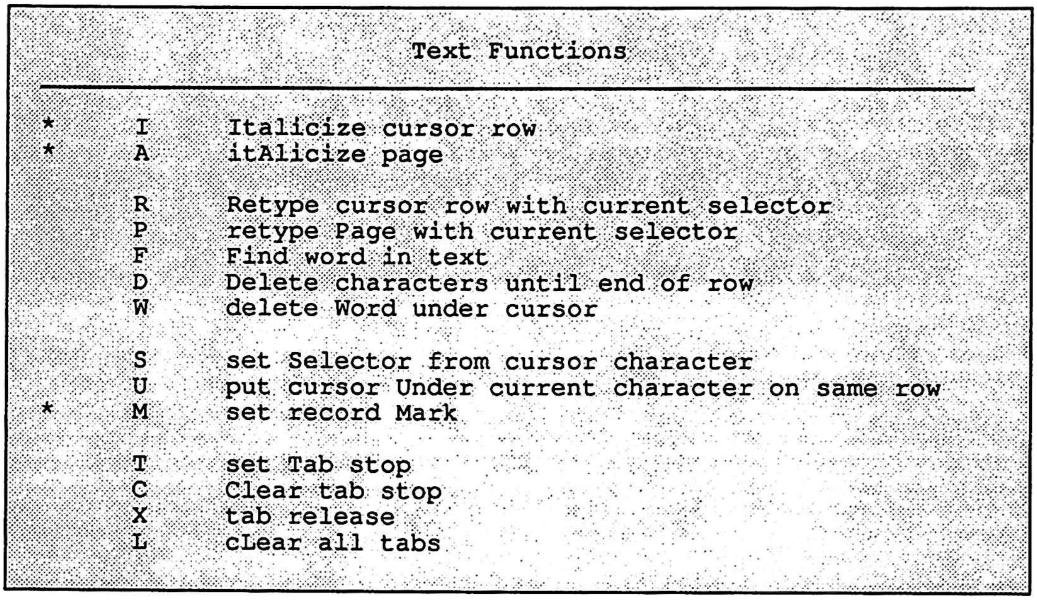
Type the appropriate letter. For example, to center the row:

Alt Cr `This is the row to center` **Enter**

The status monitor displays `<C>r> This is the row to center.`

5.3 Start a Text Function

Alt T Beep!



```
                         Text Functions
_______________________________________________________________

*      I      Italicize cursor row
*      A      itAlicize page

       R      Retype cursor row with current selector
       P      retype Page with current selector
       F      Find word in text
       D      Delete characters until end of row
       W      delete Word under cursor

       S      set Selector from cursor character
       U      put cursor Under current character on same row
*      M      set record Mark

       T      set Tab stop
       C      Clear tab stop
       X      tab release
       L      cLear all tabs
```

You can operate only the starred Dubner functions from the PC. To intialize the cursor row, type the command *before* you type the row.

Alt Ti `This row is to be italicized` **Alt L.**

The status monitor displays: `<T>i This row is to be italicized <L>`

To place a record mark, type the command *after* the row.

5.4 Record a Message

Alt R	Beep! Type a message number/name.
Enter	The message is recorded and the status monitor displays: `<message number/name>`.

5.5 Generate Text on the Dubner

Alt G After you've typed all your text on the PC, **Alt G** generates the text on the Dubner. The cursor returns to the Home position.

> To send files previously recorded on the PC, read the file into WordPerfect Doc 1. **Alt G**
>
> 1. Copies the file to Doc 2
> 2. Searches for and deletes all WordPerfect codes
> 3. Generates the text on the Dubner
>
> With this in mind, keep Doc 2 clear.

5.6 Play a K program Named Alt-

Alt A sends the keystroke command for the **Alt** key on the Dubner character generator. Add the appropriate letter for the previously recorded program. For example, **Alt A z** plays the K program `Altz`.

The status monitor displays `<A>z>`

5.7 Enter K Edit mode

Alt K	Enter K Edit mode, or if already in K Edit mode, enter K keystroke mode. **Alt K** allows you to write K programs off line.

Index

1-Nrml
  K-Paint brush style 71
1-Paint 75
2-Fill
  border 76
2-Wash
  K-Paint brush style 71
3-Cel
  K-Paint brush style 71
3-Grfx 79
  ellipse 81
  keyboard 80
  line 79
  pad 80
  rect 79
4:3 aspect ratio 106
4-Key
  K-Paint brush style 72
4-Ramps 82
5-Effects 84
  Link 84
  MoveReg 84
  MoveWrap 84
  Quant 85
6-Change 86
  Area 87
  Global 86
  Pixel 87
20-K memory 23

A

ALTa 11, 18
Anti-aliased fonts 1
  Presentation Graphics 165
Any
  2-fill 76
Any Fill 76
Area
  6-Change 87
  fill 76, 78
Area fill 76
Arithmetic expressions 20
Aspect ratio 106, 107
Auxiliary files 210
Averages
  color 62
Axes
  Presentation Graphics 176

B

Backgrounders 3
  full screen 3
  partial screen 3
Bar graph
  Presentation Graphics 189
Bar graphs
  Presentation Graphics 193
Bar stack graph
  Presentation Graphics 190
Baud rate 212
Blinking box
  Presentation Graphics 172, 178
Border
  2-fill 77
  ill-defined 78
Border fill 76
Box size
  change the 80
Break 22
Brush
  K-Paint 63
  see K-Paint brush 62
Brush chroma 71
Brush palette 66
Brush size 69
BULLET font
  Presentation Graphics 183

C

Capturing a font
  digitizer 52
CBG\Texta
  backgrounds 3
Cel
  fill 78
Cel brush 78
Cel fill 76
Change colors
  Presentation Graphics 173, 176
Change mode 86

Character Capture 103
Check point
  K-Paint 65
Color quantization 103
Color signal 43
Column stack graph
  Presentation Graphics 186
Commands 13, 16, 17
  enter 17
  playback control 30
  status monitor 28
Comments 17
Compose mode 16
Computer programming 13
Conditional
  termination 26
Conditionals 20, 35
Configuration
  Presentation Graphics 165
Connector cable
  PC RS-232 207
Connectors
  digitizer 47
Continue 22
Control areas
  Presentation Graphics 169
Control panel
  digitizer 50
Convert a slide
  Presentation Graphics 182
Convert the slide
  Presentation Graphics 192
Cross-hair cursor
  K-Paint 69, 73, 75, 86
Cursor
  move the 15
Cursor character
  delete the 15
Cursor row
  copy the 15
  delete the 15
  exchange the 15
Custom font
  create 43

D

Data
  point text 203
  Presentation Graphics 175, 195, 196, 198
  sort graph 197
Data percentages
  display 187
  Presentation Graphics 173, 179, 185, 187, 199
Data text
  Presentation Graphics 173, 197
Data values
  Presentation Graphics 173, 189, 197
Default setting
  Presentation Graphics 169
Default slide
  Presentation Graphics 166, 169
Delete a graph
  Presentation Graphics 189
Digitizer
  anti-aliasing 52
  Bl & Wh level controls 51, 52, 54
  box mode 58
  camera 51
  capturing a background 54
  capturing a character 52, 53
  capturing a font 52
  connectors 47
  control panel 50
  FREEZE/THAW 51
  front panel buttons 57, 58
  grid mode 58
  operating environment 45
  port configuration 49
  rack mounting 46
  rear rack-mounts 44
  setting up the camer 51
  side-rails 44
  stand-alone 57
  test pattern 50
Display data
  Presentation Graphics 173
Do command 11, 17
  create a 11
Do commands 22, 26
Dollar sign 18
Domain
  Presentation Graphics 202
Drop shadow
  fill chart 181
  line chart 185
  pie chart 179
  Presentation Graphics 179, 181, 185, 190
Dubner
  configure the 212
  serial port 209

E

Edge
  Presentation Graphics 190, 197
Ellipse
  3-Grfx 81
Enabled
  options i
End 22
Engraved keycaps 1
Environment
  Digitizer 45
Error message 19, 24
Expressions 20
  arithmetic 20
  else 21
  if 21
  logical 20
  then 21
  while 21

F

Fill
  area 77
  border 77
  cel 78
  key brush 76, 77
  wash brush 76, 77
Fill chart
  drop shadow 181
  label a 181
  Presentation Graphics 179, 180, 181
Flag parameters 24, 26
Floating point 13, 19
Font Fixer
  K-Paint 89
  Painting mode 89, 92, 93
  Stamping mode 89, 91
Font options 1
Foreground
  Presentation Graphics 190, 197
Free_globals 23
FREEZE/THAW
  digitizer 51
FROM box
  scanning 106
  select the 107

G

Global
  6-Change 86
Graph
  delete a 189
  label a 177
  Presentation Graphics 174, 189
  record a 174
GRAPH utility functions 123
Graphics Factory
  fonts 1
Graphics library
  backgrounders 3
Grids
  display 188
  Presentation Graphics 173, 176, 185, 188, 190, 194
Grow bars
  Presentation Graphics 174

H

Howtek RGB Scanner 103
Hue 69, 86
  Cel brush 71
  Change mode 86
  Wash brush 71
Hue bar 66

I

If-then-else 12, 13
Insert mode 15
Installing the pad
  K-Paint 97
Integer 18, 29
  convert a 33
Integer arithmetic 13
Interface cable
  Digitizer 44
International character sets
  option 1

K

K commands 20, 35
  program flow 20
K editor 13, 16, 18
  enter the 15, 16
  keys 15
K interpreter 17, 19
K playback 36
  control the 29
K program
  exiting a 27
  parameters 24
  terminate a 26
K programming language 11, 13
K programs 13, 17, 18
  create 13
  playing 18
  recording 18
K variables 18, 29
  names 18
  subscript 19
K-Paint 61
  brush palette 66
  cross-hair cursor 69, 73, 75, 86
  drawing 79, 82
  entering 62
  font fixer 89
  installing the pad 97
  keyboard 61
  keystrokes 61
  main menu 63
  menu 62-65
  pad 61-63, 65, 72, 73, 75, 79, 80, 86
  pen 63, 72, 73, 75, 77, 80, 81, 84, 86, 87
  pen motions 61
  port definitions 97
  quantize 85
  reading 95
  recording 95
  serial port 97
  starting 62
  sub-menu 63, 65, 85
K-Paint brush
  change color 65
  change colors 66, 86
  change the 65
  color 70, 73, 76, 77, 79
  default 93
  distance between strokes 69
  draw with 65
  lay down a stroke 75
  opacity 69
  paint with 65
  select types/styles 72
  shape 79
  shapes 71
  size 69
  style 76, 77, 79
  styles 71
  wash 84
K-Paint palette
  locked/unlocked 72
  sliding scales 66
K-series character generators
  fonts 1
K_WORKS2 5
  K programs 5
  Volume 1 5
  Volume 2 7
Key brush 72
Key signal
  ramp the 82
Keyboard
  control the 29
  K-Paint 61
  macros 12
Keyboard control 36
Keyboard macro
  create a 11
  play back a 11
Keyboard macros 18
  edit 12
Keyboard/Macro files 210
Keyboards
  engraved keycaps 1
Keystroke 18, 29
  enter 16
Keystroke mode 16
Keystroke sequences 11
Keystrokes 16
  remember 11
Keyword 24
Keyword parameter 25

L

Label
  a fill chart 181
  create a 170
  Presentation Graphics 179, 184
  scatter chart 184
Label a graph
  Presentation Graphics 186
Label a slide
  Presentation Graphics 189
Learn 11, 13, 16
Left/right hue
  ramp 83
Legends
  Presentation Graphics

193, 198
License
  software i
Like systems i
  multiple i
Line
  3-Grfx 79
Line chart
  drop shadow 185
  text data 186
Line graph
  Presentation Graphics 185
Link
  5-Effects 84
Local 23
Locked/Unlocked
  K-Paint palette 72
Logical expressions 20
Loop-while 13
Loops 12, 20, 35

M

Macro
  functions 11
  record the 11
Main menu
  K-Paint 63
  Presentation Graphics 169
Master font 1
  Presentation Graphics 165
Menu
  K-Paint 62, 64, 65
Message
  record a 217
MoveReg
  5-Effects 84
MoveWrap
  5-Effects 84
Multiple graphs
  Presentation Graphics 184

N

Number
  Presentation Graphics 203
Numeric keypad
  K-Paint 79
Numeric sequence
  Presentation Graphics 197

O

Odd length run 62
ON-AIR cursor
  Presentation Graphics 171, 180
Opacity 69, 71, 86
  Change mode 86
  key brush 72
  Paint character 93
  Paint character mode 93
Operator
  interaction 20
Operator precedence rules 20
Option
  license i

P

Pad
  cross-hair cursor 75
  Installing the 97
  K-Paint 61, 62, 65, 72, 73, 75, 79, 80, 86
Paint pots 66, 70, 82, 86
  record/read the 95
Painting mode
  Font Fixer 92, 93
Palette
  K-Paint 66
  see K-Paint palette 62
Pan 73
Parameters 24, 35
  flag 24, 26
  keyword 24, 25
  positional 24
PC
  connector cable 207
  directory 207
  serial port 209
Pen
  K-Paint 63, 72, 73, 75, 77, 80, 81, 84, 86, 87
Pie chart
  drop shadow 179
  Presentation Graphics 177, 179
Pin position
  K-Paint 79
Pin text

  Presentation Graphics 171, 186, 187
Pixel
  6-Change 87
Platen 105
Point text
  Presentation Graphics 203
Port
  definition 212
Port configuration
  digitizer 49
Port definition
  K-Paint 97
Positional 24
Pound sign 17
ppic 43
  stamp a 89
ppics 103
Presentation Graphics
  anti-aliased fonts 165
  axes 176
  bar graph 189
  bar graphs 193
  bar stack graph 190
  blinking box 172, 178
  BULLET font 183
  change colors 173, 176
  column stack graph 186
  control areas 169
  convert a slide 182
  convert the slide 192
  data 175, 195, 196, 198
  data percentages 179, 185, 187, 199
  data text 173, 197
  data values 173, 189
  data values text 193
  date sequence 193
  default setting 169
  default slide 166
  delete a graph 189
  display data 173
  domain 202
  drawing order 194
  drop shadow 179, 181, 185, 190
  edge 190, 197
  fill chart 179-181
  foreground 190, 197
  Grids 173, 176, 185, 190, 194
  grow bars 174
  label 170
  label a chart 179, 181, 184
  label a graph 177, 186
  label a slide 189
  legends 193, 198
  Line graph 185
  main menu 169
  multiple graphs 184
  number 203
  numeric sequence 197
  ON-AIR cursor 171, 180
  overlapping graphs 193
  pie chart 177
  pin text 171, 186, 187
  point text data 203
  record a chart 179
  record a graph 174
  record a slide 186
  record data 175
  record graphs 180, 181
  scaling 181, 185, 202
  scatter chart 183
  selector assignments 170
  sequence 201
  slide 171, 186
  sort graph data 197
  sub menu 169
  ticks 176, 177, 180, 194
Preset-color font 89
Printer
  files 210
  options 211
  parameters 210
  select a 211
Printer file 207
Program
  scroll through the 15
Programming language 12
Pseudo-variables 24

Q

Quant
  5-Effects 85
Quantize
  K-Paint 85
QUANTIZING 108
Quotation marks 19

R

Rack mounting
  digitizer 46
Ramp
  4-Ramps 82
  left/right hue 83
Re-boot 23
Read
  K-Paint 95
Real number 18, 29
  convert a 33
Recall
  color pictures 103

Record
  K-Paint 95
Record a chart
  Presentation Graphics 179
Record a slide
  Presentation Graphics 186
Record data
  Presentation Graphics 175
Record graphs
  Presentation Graphics 180, 181
Rect
  3-Grfx 79
Return command 26
RGB color ramp 82

S

Same site
  options i
Saturation 69, 86
  Cel brush 71
  Change mode 86
  Wash brush 71
Scaling
  display text 185
  Presentation Graphics 181, 185, 202
Scan
  color pictures 103
  start the 105
Scan Rectangle 107
Scanner bed 105
SCANNING 105
  the FROM box 106
  the TO box 107
Scatter chart
  Presentation Graphics 183
Selector
  select a 214
Selector assignments
  Presentation Graphics 170
Sequence
  Presentation Graphics 201
Serial I/O 13
Serial input 32, 36
  control 20
Serial output 32, 36
Serial port
  Dubner 209
  K-Paint 97
  PC 209
Serial ports 32
Side-rails 44
Sign
  at 37
  dollar 18
  pound 17
SIN i
Size
  see Brush size 69
Slide
  convert a 182
  convert the 192
  label a 189
  Presentation Graphics 186, 189
  record a 171, 186
Software site license i
Stamping
  entire fonts 89
Stamping mode
  Font Fixer 89, 91
Status monitor 35
  commands 28
Step 69
Store
  color pictures 103
String 18, 29, 33
  convert a 33
  operators 34, 36
Sub menu
  Presentation Graphics 169
Sub-menu
  K-Paint 63, 65, 85
Subroutines 13, 22, 24, 27, 35
System variables 37

T

Tap
  the K-Paint pen 70, 81, 82, 84, 87
Test pattern
  digitizer 50
Text
  center or position 215
  display 20
  generate 217
  start a function 216
  transfer 207
Text data
  line chart 186
Text manipulation 13
Ticks
  Presentation Graphics 176, 177, 180, 194
TO box
  scanning 107
  select the 107
Transfer

  text 207
Type conversions 33, 36
Typeover mode 15

U

Undo
  K-Paint 65
Unpacking 44

V

Value 69, 86, 93
  Cel brush 71
  Change mode 86
  key 82
  Key brush 72
  Wash brush 71
Variables 12, 16, 35
  global 23
  local 23
  share 23
  subscripted 13
  system 37
Video input
  black & white 43
Video signal
  convert a 43

W

Word processor 15
Word wrap 212
WordPerfect
  configure 210
  macros 207, 214
  transfer text 207

Z

Zoom 73